SAMPLE

Great Observatories: Palomar Observatory

The Giant Eye

Aira Astralis

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Conclusion

This free sample contains the Introduction and Chapter 1. The complete book contains the full contents above.

Introduction

South of the small town that gives it its mailing address, up a winding mountain road that the summer traffic climbs past the pine line, stands the most famous single building in American astronomy: a great white dome set on a bare shoulder of the coastal range, visible for miles, housing a telescope that the middle of the last century built as the largest in the world and that this one still works every clear night. This is Palomar Observatory, the mountain home of the two hundred inch Hale Telescope, the giant eye of the subtitle's promise, and this volume is its full account: the vision that imagined it, the decade and the Depression that built it, the glass that was cast twice and ground for eleven years, the mount that carries half a thousand tons in a moving embrace, the surveys that mapped the northern sky, the discoveries that broke the universe open, the people who ran the place from its founding director to the first woman allowed through the observer's door, and the long afterlife of a telescope that was declared obsolete more than once and kept on working.

The mountain's fame deserves a word before the chapters begin, because the place is one of the few scientific facilities the general public knows by sight. The dome's white curve has stood for astronomy in the public mind since the forties: the magazine covers, the film backdrops, the postcards of the winding road, and the schoolbooks' pictures of the big machine all carry the mountain's silhouette, and the reader who has never pointed a telescope has still seen this one, the fame the later chapters inherit and the public chapters earn, the book's own starting fact that the subject is a landmark as well as an instrument.

The reader should grasp early what sort of account this is, because the observatory is not one machine but a small city of them. The mountain carries several instruments of different sizes and duties: the great reflector that the world knows, the wide-field Schmidt camera that photographed the whole northern sky twice over, and the smaller workhorses that carried the search programs. The story of the place is therefore several stories at once: a telescope story, about the biggest single mirror an era could pour and polish; a survey story, about the photographic atlas that generations of astronomers grew up consulting; and a people story, about the observers whose names rode the mountain's logbooks and whose discoveries rewrote the textbooks from the stellar populations to the quasars. The chapters take the stories in turn, and the reader who wants the machine alone will still find it in every one of them, because the giant eye was the place's heart and every program on the mountain fed on its light.

The conventions' note belongs at the preview's end, the book's own scope stated plainly: this volume treats the mountain as one instrument among the science's many, the sibling books holding the radio arrays, the space telescopes, and the modern giants, and the reader who wants the whole observatory generation will find the shelf arranged for that journey, the volume's own duty being the classic's full account, the preview's close and the book's standing promise of the honest whole.

The preview list, in the series' usual run: the vision and the funding came first, a builder's last campaign secured before his death; the glass and the road and the dome came second, a construction saga the Depression and the war both stretched; the first light came third, and with it the beginning of the observatory's long reign as the world's leading instrument; the sky survey came fourth, the atlas that made the mountain a library as well as an eye; the quasars came fifth, the discovery that the universe held objects the old astronomy had no category for; and the modern era came last, the refits and the new instruments that keep a seventy-year-old telescope competitive in a field of modern giants. The chapters unpack each item, with the honest accounting of the costs and the crowding that the series always pays.

The fame deserves its own opening note, because this mountain entered the public world as thoroughly as any scientific instrument ever has. In the middle decades of the last century the great eye was a newspaper fixture: the magazines carrying its casting and its dedication, the nickname in the headlines, the public touring the dome on summer weekends, the mountain serving as the era's very picture of what a big science instrument looks like; the introduction keeps the fame as a fact of the instrument's history rather than a decoration of it, the telescope having carried the burden of being famous while it worked, and the reader holding from the start the volume's full subject: not only the glass and the dome but the legend, the two having shaped each other for eight decades, the fame being as real as the focal length and about as measurable.

A note on the catalog's manner, since observatory books are the series' own genre within the genre. These volumes treat a working facility the way the biographies treat a person: a conception, a childhood, a career of programs, a character, an aging and a posterity; the reader of the observatory shelf will find each mountain given the same sixteen stops, and the value of the uniformity being the comparability, the mountains reading as a generation of siblings with distinct temperaments; this book's promise is the same as its siblings': the place treated whole, the engineering and the science and the sociology of a working observatory given their honest pages, the reader finishing with the mountain known the way a colleague knows it, by its habits

as much as its numbers.

Chapter 1: The Discovery of Palomar Observatory

The discovery story of an observatory is the story of its conception, and Palomar's conception belongs to one of the great careers in the history of instrument building, the American solar astronomer whose last campaign this telescope became.

The builder's own gift deserves the frame's first line, because the machines were one talent and the man was another: the solar observatories he founded, the journals he established, the institutions he recruited and organized, and the international union he helped bring into being, all of it the work of a man who built the field's infrastructure as relentlessly as its instruments, the career the biographies cover in full and this chapter tallies as context, the builder's double legacy of places to work and ways to organize the work.

The builder's earlier monuments frame the story. George Ellery Hale, the astronomer whose name the great telescope now carries, had spent a career collecting instruments the way other scientists collect results: the great refractor of the Wisconsin observatory that his early solar work made famous, the mountain reflectors of the California solar station he founded above the growing city, and then the two great telescopes of the mountain that became the center of the astronomical universe in the nineteen teens and twenties, the sixty inch and the hundred inch, the first of which is still spoken of as the instrument that taught the field what a modern reflector could do and the second of which took the human eye deeper into the universe than it had ever been.

Each of these machines was, in its own day, a leap beyond what anyone had dared, and each was built by the same method the builder would use once more: find the money, imagine the glass, and recruit the institution that would run it.

The last campaign began with the money. In the closing years of the nineteen twenties, the builder secured from the new science fund of the Rockefeller foundation a grant of six million dollars for a telescope of two hundred inches, a sum and a size that doubled the previous record in both columns at once. The size itself deserves the chapter's first pause: a two hundred inch mirror gathers four times the light of the hundred inch, and light is the currency of the science, so the doubling of diameter was a sixteenfold multiplication of the faint things the eye could reach. The grant was made to the institute that had run the earlier mountains, and the builder set about spending his last decade of health on the project that would outlive him.

The survey's own tools belong in the choosing's account, the science the site hunters used: the star counts that measured the sky's darkness, the seeing estimates the naked eye and the small telescope made, the weather records the candidate mountains' keepers supplied, and the access arithmetic the road and the power lines posed, the choosing being a study in tradeoffs the modern site surveys still run on the same axes, the account's standing note that the mountain was picked by data a decade before the word entered the field's working language.

The site came next in the story's order, and the choosing was a scientific campaign in itself. The new telescope needed darkness, and the older mountain's skies were already brightening under the young city's lamps, so a survey of candidate mountains ran through the late twenties and early thirties, testing the coastal ranges and the deserts for clear, dark, steady air. The chosen ridge lay far enough south to be away from the young city's glow, high enough to sit above the coastal haze, close enough to the institute to be workable, and blessed with the mild, dry air the coastal range provides, and the mountain's name entered the science's history the day the site report closed: Palomar, the mountain whose waters the original mapmakers had noted, now the address of the world's next largest telescope.

The war years deserve their own entry in the building account, the longest pause in the saga. The construction had reached the shell by the time the country entered the war, the dome standing on the ridge while the optical shop's grinding slowed to a crawl, the staff scattered to the war's laboratories, and the mountain waited out the conflict half built, the giant's first light postponed by the world's darkness, the irony the dedication speeches noted and the history records, the war years being the saga's quiet middle act and the reason the machine's birthday came a full decade after its glass.

The final act of the discovery story is the saddest and the most fitting: the builder did not live to see the mountain completed. He drove the project through the casting and the construction, chose the site, approved the design, and saw the glass poured and the dome rising, and then his health, long fragile, failed him in the winter of nineteen thirty eight, a decade before the dedication. The war stretched the building years further, and when the telescope finally opened its eye in the spring of nineteen forty eight, the dedication honored the man by giving his name to the machine, and the obituary's fair summary is the one the field repeats to this day: the builder was the greatest maker of telescopes who ever lived, and the mountain is his monument, the last and greatest of the instruments he imagined, named for him, and left to the science he served.

The casting's drama fills the first room of the conception chapter, because the founding story of this mountain is a glass story. The mirror's blank was poured twice: the first pour, a great disk of the borosilicate glass the era's oven works had developed, cracked in cooling, the flaw undoing a year of preparation; the second pour, rushed out of the ovens ahead of a rising river flood, the workers bailing the packing crates by hand as the water rose, the disk loaded to its railcar with the flood at the foundry's door; the chapter's honest scale: the largest glass casting ever attempted, its survival a small epic of labor and luck, and the disk's subsequent journey, a slow train ride across a continent with crowds at the crossings, the nation watching the telescope's heart travel at walking speed, the conception of the observatory being, for the public, a glass disk on a flatcar, waving.

The war's pause takes the second room, because the conception had an involuntary intermission. The disk and the dome's steel were ready when the world's war absorbed the decade's engineering capacity: the mountain's construction halted for years, the mirror stored, the staff dispersed to the war's laboratories, the mountain waiting with its unfinished dome for the peace; the chapter's honest chronology: the design matured during the pause, the instrument generation planned in the thirties arriving only in the fifties, and the pause's meaning for the telescope being a strange gift: the observatory opened into a postwar science with new questions waiting, the instrument reaching completion into a sky that had changed while the war ran, the largest eye beginning its work with a fresher task list than its designers had drawn.

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ABOUT THE AUTHOR

Aira Astralis is a science writer specializing in astronomy and space exploration. Her work spans the full breadth of humanity's relationship with the cosmos -- from the earliest naked-eye observations to the engineering marvels of modern space missions.

Her books are built on a foundation of primary sources: peer-reviewed research, mission archives, and direct engagement with the scientific community. She writes for readers who want to understand not just what we know about the universe, but how we came to know it.

She believes that the most important frontier is not out there but in the gap between what scientists discover and what the public understands. Her books exist to close that gap.