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### ***The Black Cloud: Scientists in Science Fiction***

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It's not often one finds oneself a pivotal character in a man's moral play cum science fiction novel, but that's exactly what happened to Joseph Pawsey in 1957. Whether or not he was aware of his fictional fame among a cast of many of his colleagues, we shall never know.

Most science-savvy readers of Sir Fred Hoyle's science fiction masterpiece, *The Black Cloud*, have long recognized the novel as a wish fulfillment fantasy for the author. What fewer readers may have realized is how many of Hoyle's favorite contemporaries join him as supporting characters — beyond Joseph Pawsey and *despite* Hoyle penning a Preface to the contrary.

In fact, Hoyle's exact wording in his Preface is wily, referring to *institutional posts* and not the scientists themselves: "I have been at particular pains to ensure that the associated characters have no reference to actual holders of these posts." This is *not* the same as saying that characters in his book are not based on actual people. A bit cheeky, that.

Nonetheless, in his eagerness to pen his "frolic," as he calls it, Hoyle has drawn too deeply on real scientists to ever hope of convincing his colleagues that those characters are purely fictional. Hoyle surprises, however, by not using *The Black Cloud* as an opportunity to defame any of his rivals in their fictional guise. In fact, even as his fictional persona outwits them, he is fairly *gracious* with them — so, none of his colleagues must have felt they needed to shake a libel stick at him. Assuming any of them ever read it, that is.

Also in his Preface, Hoyle seems to dismiss the possibility that his opinions have been "forcibly expressed" within the book, adding that the "association" between author and characters "*may be unwarranted.*" [Italics, mine.] Anyone familiar with Hoyle and his opinions will quickly spot that that every sociopolitical statement his main protagonist speaks is a well-worn diatribe of Hoyle's own. It's almost as if his farcical Preface challenges the reader to a game of spot the scientist or rack up the rants! OK, we accept.

### ***An Island unto Himself***

In creating his fictional characters, Hoyle may not have had enough socialization outside of his academic peers to construct an individual who wasn't already known to him; ivory tower syndrome is not uncommon among highly-focused scientists, especially those as reputedly arrogant as Hoyle.

From interviews and his other works, we know Hoyle mostly ignored common folk and tradesmen, despite being born into a humble family. Not surprisingly, Hoyle's non-scientist characters are weakly-portrayed or offensively uncomplicated, and he dedicates some particularly cringeworthy pages to the gardener and his wife who may be based on the post holders at Cambridge with whom Hoyle may have exchanged words. (Here's to hoping they never read *those* printed words.) A bit unexpectedly in light of Hoyle's collegial respect for female astronomers, *The Black Cloud* fits in with the genre at the time where women appear only when the author needs foils or fawners.

Even observational astronomers didn't escape his hubris. Despite his dependence upon their efforts for his theoretical pursuits, he nonetheless relegated astronomical data akin to the numbers gardeners enter into their catalogues,<sup>1</sup> while "radio data serves like a good dog on a hunt!"<sup>2</sup> Unpack that as you will, but only Hoyle's fellow polymaths appear worthy to be in the room arguing with his fictional persona, as his readers frequently endure in his fictional rooms within *The Black Cloud*.

In 1956, a year coincident with Hoyle's penning of *The Black Cloud*, even mild-mannered, community-builder Joseph Pawsey has tired of Hoyle's attitude. As a Fellow of the Royal Society, Pawsey was asked to rate new candidates for Royal Society Fellowship. He was less than supportive of Hoyle, saying:

*Has been a major stimulus to British astronomy, partly by irritant tactics. Full of ideas, many of which turn out to be wrong. I am critical of his habit in books and lectures of not distinguishing clearly between his own tentative hypotheses and those generally accepted. I do not recommend election.*<sup>3</sup>

Despite Pawsey's denunciation, Hoyle was elected a Fellow in 1957. Hoyle would not have known how Pawsey felt about him, so it cannot be used to explain a certain fictional Australian radio astronomer's puzzling demise at the end of the book.

Undeniably, Hoyle's strong persona is truly distinguishable as the main protagonist in *The Black Cloud*—celebrated in fact in passages acknowledging his less-than-amenable persona as "a hothead" and "thoroughly malevolent." And Hoyle's entrenched beliefs clearly drive the plot to its surprise ending.

As we'll see in further examination of his fantasy and its players, *The Black Cloud* gifts historians with an insider's view of mid-1950s astrophysics, with Fred Hoyle holding court at the center.

### **Where Fact Meets Fiction**

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<sup>1</sup> Hoyle, F. *Home Is Where the Wind Blows: Chapters from a Cosmologist's Life* p 413.

<sup>2</sup> Hoyle, F. *Galaxies, Nuclei and Quasars*. p 43.

<sup>3</sup> National Archives of Australia, C3830, Z1/3/VI. Pawsey personal papers to the Secretary Royal Society of London, 5 January 1956

*The Black Cloud* begins at Caltech with an observation of a large, star-obscuring cloud whose sudden appearance startles even the most seasoned astronomers. They gather for energetic discussions led by senior astronomer Geoff Marlowe whose expertise and personality bear some resemblance to Caltech astronomer Rudolph Minkowski—who also had a reputation for filling a room with smoke.

During the early 1950s, Hoyle was making extended visits to Caltech as he worked on his stellar nucleosynthesis research. Minkowski was an expert on the spectroscopy of gaseous phenomena, specifically supernova remnants and planetary nebula, and was a senior scientist at Mt Wilson and Palomar Observatories.

In 1948, Minkowski was contacted by Australian radio astronomer John Bolton to help with his groundbreaking work of matching radio sources to optical counterparts.<sup>4</sup> As a result of the successes of their partnership, which Hoyle would have heard Minkowski speak about at Caltech's weekly Astronomy-Physics lunches,<sup>5</sup> Minkowski became an ambassador for radio astronomers, welcoming and mentoring the Australians into the greater astronomy community. Not coincidentally, Hoyle portrays Marlowe as suggesting the Australian radio astronomers should be invited to observe the cloud to obtain its velocity measurements.

Back in the fictional room at Caltech, a 27-year old wunderkind named Dave Weichart is brought in to join the debates about the nature and course of the mystery cloud. Weichart is likely based on prodigy Murray Gell-Mann who was about the same age and also at Caltech while Hoyle was writing *The Black Cloud*. Weichart whizz-bangs some math to determine that the cloud is on a course for Earth and will impact in about 18 months. In a bold stunt rarely seen in science fiction novels, Hoyle includes differential equations to “explain” how fast the cloud is moving!

The plot then leaps the ocean to England where an amateur astronomer has presented observational data suggesting that the planets Jupiter and Saturn are no longer keeping to their orbits. These observations are confirmed by the Astronomer Royal, whom Hoyle never names but whose expertise in astrometry makes him a match for the actual AR at the time, Spencer Jones. So, despite his protests in the *Preface*, Hoyle has not even tried to disguise the real person in the actual post.

Enter our main protagonist and Hoyle's not-so-alter-ego, Christopher Kingsley, Professor of Astronomy at the University of Cambridge (Hoyle's own institution), and the most handsome and smartest man in every room. Ahem. Kingsley listens to the astrometry results but is skeptical, requesting the AR's Solar System data to enter into the computers at Cambridge for analysis. Hoyle then dedicates many pages of his book to detailed descriptions of the painstaking process of using the computer successfully.

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<sup>4</sup> <https://www.nap.edu/read/577/chapter/12#280>

<sup>5</sup> <https://www.nap.edu/read/577/chapter/12#279>

These early paper tape-driven computers were huge and very particular, requiring patient, precise handling. Historians have noted that some of Hoyle's contemporary research groups had abandoned their struggles early on with these unwieldy computers. A gracious reader might argue that *The Black Cloud's* lengthy computing scenes were Hoyle's way of demonstrating how to persevere and benefit from these powerful instruments of science. A snarky reader thinks maybe he was just trying to show off.

Regardless of Hoyle's motives, the scenes are vivid and accurate depictions of working with the new technology, and, for historians not also familiar with them, a wonderful snapshot in time.

The computer gives Kingsley enough data to calculate the location for the large gravitational object that is affecting the planets. Before Kingsley and the AR can get a clear night to look for the predicted object with the University's telescope, they are summoned to Caltech, thus joining the two discovery teams in heated and very technical discussion.

In these scenes, Hoyle gets to flex more math muscle, and the pages read like a university physics lesson. But for the patient reader, they also explore the dynamics of scientific debate back before email fatally reduced face-to-face opportunities for argument and discourse.

Lengthy as these scenes are, they really do paint a vivid picture of academia and the humanity that fuels inquiry and discovery. Additionally, Hoyle then gives the readers a depiction of the dark side of academia: its bureaucracy, which is eerily familiar to any government-funded researchers reading it today.

The joint team signs a report describing their findings and preliminary analysis, and a copy is given to both the President of the United States and the Prime Minister of Great Britain. Both governments decide that the black cloud's existence needs to remain secret, because, basically the peasants will freak out. Seemingly prescient of his government's response, Kingsley sends cryptic but non-divulging letters to very specific cronies around the world.

When the Home Secretary arrives to convince Kingsley to remain quiet, Kingsley enjoys a few rounds of verbal fencing before the visitor returns to London enraged. When MI5 raid Kingsley's rooms, they find the register of letters he's sent, intercept the one that hadn't reached its addressee, and realize the security implications. The Prime Minister's Secretary arrives to inform Kingsley that the government sees no alternative but to sequester Kingsley and those "competent" scientists who can work on the analysis. Before long, Kingsley and everyone he's written to become part of a secret, guarded thinktank in the Costwolds. Only the PM's Secretary suspects they've been played.

These pages are pure, gleeful fantasy for Hoyle, a table-thumping technocrat. Through Kingsley, Hoyle permits himself a diatribe on his opinions of and frustrations with politicians whom Kingsley describes as "an archaic crowd of nitwits." And through Kingsley, Hoyle becomes a cunning and sardonic genius, successfully conniving and deceiving governments, colleagues, and even a woman he fancies into gilded secondment. Soon, Kingsley is presiding over an all-

inclusive, sci-tech hideaway supplied with endless resources to study the potential perils of the approaching black cloud.

The men of Kingsley's elite roundtable comprise the Caltech astronomers, including Weichart, and Marlowe. Joining them is a sarcastic Soviet theoretical physicist named Alexis Alexandrov, a character likely based on Iosif Shklovsky. Hoyle was a fan of Shklovsky's work,<sup>6</sup> and both men had devil-may-care attitudes about proposing and defending their personal theories.<sup>7</sup>

Shklovsky was at heart a polymath, but he held expertise in plasmas and gaseous phenomenon. Of particular relevance to Hoyle's tale, Shklovsky also theorized the stages of stellar death post red giant phase,<sup>8</sup> postulated on extraterrestrials, and was a pioneer of radio astronomy in the Soviet Union.<sup>9</sup>

In fact, at the time of *The Black Cloud's* writing, Shklovsky had recently founded the radio astronomy department within Moscow University. Radio astronomy's rapid-fire advances in the 1950s may have spurred Hoyle's penning of this novel, as he fondly recalls in his autobiography attending a talk by Charlie Townes about the possibility of detecting spectral lines in radio data.

And then as if on cue, a thinly-veiled clone of Martin Ryle arrives as the Cambridge radio astronomer John Marlborough, a stubborn but competent ally of Kingsley's. This likeness comes with some eyebrow raising for readers familiar with astronomy's saucier times, for Ryle and Hoyle had just become bitter rivals in the steady-state Universe debate during the penning of *The Black Cloud*.

In 1955, Ryle's 3.7m radio data<sup>10</sup> from the ill-fated 2C survey—fraught with confusion errors—were nonetheless correctly interpreted as showing evolution of galaxies and therefore disproving Hoyle's steady state models. In Australia, however, higher resolution 3.5 m radio data<sup>11</sup> from the innovative Mills Cross telescope partially resolved those confusion errors, but Bernard Mills interpreted those data as supporting steady state models of the Universe. Joseph Pawsey, Mills' mentor and inspiration for the crisscross shaped radio antenna,<sup>12</sup> backed the Australian results.

These surveys split radio astronomers and spurred derision for radio astronomy within the astronomical community, so it is a testament to Hoyle's intellectual character that he should hinge so many twists of the plot of *The Black Cloud* on radio astronomy observations and techniques, demonstrating its power as a hunting dog for the prey of understanding.

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<sup>6</sup> <https://www.nytimes.com/1964/01/24/archives/blasts-reported-in-the-milky-way-russian-astronomer-gives-evidence.html>

<sup>7</sup> [http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle\\_query?1985SvAL...11..131](http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?1985SvAL...11..131).

<sup>8</sup> [http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle\\_query?1985SvA....29..364](http://articles.adsabs.harvard.edu/cgi-bin/nph-iarticle_query?1985SvA....29..364).

<sup>9</sup> <http://www.phys-astro.sonoma.edu/BruceMedalists/Shklovskii/index.html>

<sup>10</sup> (published by Shakeshaft, Ryle and colleagues)

<sup>11</sup> (comparable resolution in the EW direction and an order of magnitude more resolution in the NS direction)

<sup>12</sup> <https://academic.oup.com/astrogeo/article/53/2/2.19/212497>

However, it does come as a huge surprise, then, that Hoyle should choose to include a fictional version of rival Ryle in his fantasy *without turning him into a total stooge*.

In the text, Kingsley “chivvies” Marlborough’s participation, says getting these data are his “main concern.” And he’s correct to insist on them, as Marlborough’s radio observations provide “startling” temperature and velocity data about the cloud. Hoyle lets Marlborough be the one to announce an encouraging physical change in the cloud’s structure just as the world seems about to end—a critical turning point in the plot.

That said, Kingsley’s interactions with and comments about Marlborough appear to underline Hoyle’s feelings about Ryle as a tool, not a peer. In the first of a few digs, Kingsley gloats to colleagues that he never told Marlborough what he wanted the observations for, as if Kingsley is commanding the radio astronomer as master would to dog. Later, and fairly smirkworthy, Kingsley figuratively slaps Marlborough—twice, in fact—by saying his results need to be confirmed. Yes, this is proper scientific method, to be sure; but it can *also* be seen as Hoyle getting his chance to gloat over Ryle’s 2C failure by telling him his data can’t be trusted.

Of further entertainment is that Marlborough just stops showing up in the story as soon as his astronomical radio data are no longer necessary, whereas the other radio astronomer in this tale becomes a colleague whose presence is amplified (pun intended); his role in the story becomes second only to Kingsley.

Of course, this is Australian radio astronomer Harry Leicester completing Kingsley’s brain trust, a humble man whose expertise in radio astronomy—particularly his mastery of antenna engineering—is unequalled. Leicester is the leader of radio astronomy in Australia, which at the time of the penning of *The Black Cloud* could only equate him with one person: Joseph Pawsey.

It probably doesn’t hurt that Hoyle would have favored Pawsey in real life for his apparent support of him vis-a-vis the steady state theory, even though the feeling wasn’t mutual. As one example of Hoyle’s reverence, the reader will notice that Kingsley invites Leicester, not Marlborough, to the fateful visit of the British Prime Minister.

The greatest evidence of Hoyle’s admiration for Pawsey is that Leicester’s radio work becomes paramount to the understanding of the true nature of the approaching cloud—that it is a living, thinking creature of huge intellect.

Whereas Marlborough suddenly disappears in the book, Leicester’s instrumentation prowess, ability to adapt to new ideas, and natural talent for inspiring others pushes him into prominence in the plot as the team’s work pivots rapidly and changes focus on communicating with the cloud to save mankind. In fact, Hoyle asserts that only Kingsley and Leicester hold the super-secret code for communicating with the cloud—until the code is sent to Kingsley’s granddaughter in the Conclusion.

Two professional women are also among the group, and though they could have contributed to the discourse, Hoyle relegates them to the background, and worse: to making the coffee.

### ***The Gentleman's Club***

In the modern genre classifications of science fiction, *The Black Cloud* would be shelved as a “hard science” fiction novel where science drives the story, and readers are expected to comprehend the math and technical problems presented liberally within. This is a subgenre traditionally assumed to have an overwhelmingly male readership, and as a piece in its time, its plaintive sexism is engrained as conventional—nay, *acceptable*.

Throughout *The Black Cloud*, and to his credit as an author, Hoyle frequently mitigates the recurring technojargon exchanges by keeping non-scientific, but intellectually curious, characters in the room during his protagonists’ headiest discussions.

For example, Kingsley’s girlfriend, Ann Halsey, is a pianist (like Hoyle’s mother) and not at all demure about wanting to understand what’s going on. And Francis Parkinson, the secretary to the UK Prime Minister, is present in the compound to keep the Government apprised, and therefore needs to understand what is going on well enough to explain to the “nitwit” politicians. Both characters ask for clarification quickly and often throughout the lengthy debates, giving the non-technical reader a slight chance to comprehend the arguments as Kingsley explains them.

That said, the book is still not going to appeal to casual readers or many modern women—and one can’t help but realize that Hoyle doesn’t care about those folks anyway, addressing only his “scientific colleagues” as the readers in his *Preface*.

And therefore, Hoyle thrives in this subgenre, flexing his polymath muscles across pages and pages of scientifically grounded theoretical discourse. Through the haze of pipe smoke and the creaking of leather seats, Hoyle can argue and pontificate with his contemporaries (albeit in their fictional guises) about astrophysics and the state of the world in equal measure.

For one familiar with his background, Hoyle appears to be recreating his happy days in academic camaraderie with Hermann Bondi and Thomas Gold at the Admiralty Signals Establishment, a WWII-era radar thinktank that was located in Surrey. There, he directed the theory group, and from members’ published recollections, he was much admired.

In *The Black Cloud*, Hoyle paints himself similarly holding court within an exclusive, upper-middle class gentlemen’s club, surrounded by the greatest thinkers of his day who hang on his every word, while beautiful women serve him drinks. If one considers that Kingsley has also kidnapped a small orchestra and cadre of artists, his fictional 18<sup>th</sup> century Nortonstowe manor house resembles the 18<sup>th</sup> century Cannons House, with Hoyle vicariously lording over this technocracy as a modern Duke of Chandos.

As if spurred by the allure of his fiction, soon after *The Black Cloud* was published, Hoyle began a successful crusade to establish a similar thinktank at the University of Cambridge. His resultant Institute of Theoretical Astronomy was the foremost academy of its kind for many years before merging into the Institute of Astronomy. And, women were treated as equals there.

One cannot help but wonder if in his penning of a self-glorifying fantasy he was not planning his strategy for convincing Cambridge stakeholders to make him a lord of astronomy. After all, pseudo-biographical epics worked for Maximilian I's ambitious propaganda machine.<sup>13</sup> It's no wonder, then, that Hoyle chose the name "Kingsley" for himself.

### ***Axes to Grind***

Warts and all, Hoyle portrays his fictional clone Kingsley as the brilliant hero, as his fellow scientists frequently comment. Hoyle's ego-stroking dialogue was written soon after he had completed his masterful work on stellar nucleosynthesis, the basis for understanding how stars evolve and probably one of the greatest models ever theorized in astrophysics. However, he also was becoming embroiled in defending the much-less lauded steady-state theory of the Universe against peers he felt were not simply wrong, but *deluded* not to agree with his hypotheses.

Hoyle's base denunciation against the Big Bang theory (a name ironically, that he coined) was that he believed its proponents were too absorbed with religious myths to accept any model but an "event one," Creation-esque origin for the Universe. By 1952, even Pope Pious XII had blessed the Big Bang Theory as dogma, making steady state appear atheist.<sup>14</sup> Hoyle felt that astronomical observations had become religiously biased, whereas his theoretical calculations were broader minded and more rational.

It has been noted by contemporary astronomers that every effort seemed to be made to denounce the steady state theory<sup>15</sup> until, of course, the results from sophisticated instruments detected and then mapped the microwave background radiation cries of the infant Universe that finally nailed the steady state theory closed for all but Hoyle and few staunch supporters.

One can therefore forgive Hoyle for taking a potshot at his rivals in *The Black Cloud*. For example, when the cloud states that it knows of no "first" of its kind, no creation event, Kingsley and crony Marlowe think: "That's one in the eye for the exploding-universe boys." Hoyle makes this easily-discernible attack on his opponents; however, one could claim that *The Black Cloud's* climax went *well* beyond a cheap jab.

When it reaches Earth, the cloud inadvertently causes widespread death and destruction. Although it was Alexandrov who first personifies the cloud as a "bastard," it is Kingsley who

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<sup>14</sup> <https://history.aip.org/history/exhibits/cosmology/ideas/bigbang.htm>

<sup>15</sup> <http://adsabs.harvard.edu/full/1999JAHH....2...81T>



argues that it really is sentient and sapient by working closely with Leicester on a series of radio transmission experiments. They soon learn, to their astonishment, that the cloud is a vast networked and ancient intelligence that has been roaming the Galaxy seeking intellectual stimulus.

After being exposed to the religions of humanity, however, it changes its previously-held beliefs in its own steady state and has an all-consuming desire to seek out its creator. Hoyle describes how the dogma of common man, the “dullard” as he has Kingsley exclaim it, has so tainted the glorious cloud that it now will starve itself, forego its nature and noble purpose, to seek a higher power which it admits may result in a spontaneous conversion into a supernova remnant incapable of allowing further information to escape from itself. For 1957, Hoyle’s inclusion of what reads uncannily like Oppenheimer’s 1939 black hole theory<sup>16</sup> is another nod to his brilliance.

Hoyle then writes an incredulous end for the heartbroken Kingsley who *dies* trying to absorb the cloud’s vast store of advanced technical knowledge before it departs on its potential suicide mission, setting his alter ego up as a kind of scientific martyr who sacrifices himself for an unworthy humanity’s betterment.

In this way, *The Black Cloud* can be seen as Hoyle’s moral play depicting the belief systems of man as blinding progress and intellectual sight, a parallel to the author’s own beliefs about intellectual comfort and dogma’s impact on scientific clarity—specifically, the astronomical community’s refusal to adopt his steady state theory in favor of a more trivial Big Bang model.

Hoyle never gave up this crusade nor did he lighten his disparagement of others whom he did not value as intellectual equals. Hoyle’s disdain in the decades following the authorship of *The Black Cloud* evolved into verbal contempt for everyone who didn’t agree with him. Even when his motives were noble, such as decrying Jocelyn Bell’s omission from the 1974 Nobel Prize, he was unable to diplomatically convey himself to those he saw as inferiors--a trait which likely lost him his own Nobel Prize in 1983.<sup>17</sup>

For those whom he did not consider combatants, he could be a thoughtful and considerate colleague and friend, as contemporaries of his have noted time and again. A particularly poignant example returns us back to Joseph Pawsey who, as far as his last publications reveal, never stood up in favor of the Big Bang Theory, stating “we find the present evidence inadequate for deriving any cosmological conclusion...”<sup>18</sup> Had Hoyle read this paper?

One wonders, because in 1960, the Royal Society met in London and announced Joseph Pawsey was to receive its prestigious Hughes Medal. The presentation was to be in November 1961 in London, but Pawsey was unable to attend the ceremony as he was in Australia for the opening

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<sup>16</sup> J. R. Oppenheimer and G. M. Volkoff, “On Massive Neutron Cores” *Phys. Rev.* 55, 374

<sup>17</sup> <https://www.theguardian.com/science/2010/oct/03/fred-hoyle-nobel-prize>

<sup>18</sup> Pawsey, J and E.R. Hill “Cosmic Radio Waves and Their Interpretation” p 112.

of the Parkes Telescope. Shockingly, Pawsey would then be diagnosed with a brain tumor and undergo surgery in mid-May 1962 in Boston in the United States. He returned to Sydney soon after, but never fully recovered, and in late October was admitted to Victoria Private Hospital in Potts Point for palliative care where his condition rapidly deteriorated.

Whether it was Hoyle's initiative or the Society's, we do not know, but the Royal Society entrusted Pawsey's Hughes Medal to Hoyle who was heading to Sydney as a visiting scholar at a number of Australian institutions, including the University of Sydney. On 2 November 1962, Hoyle arrived at the hospice to formally present Pawsey with the medal on behalf of the Society. The Pawsey family was deeply touched by this gesture. Sadly, Pawsey passed away before the month was out.

And presciently, just a few years earlier, Hoyle had written a tragic ending for Pawsey's character, Harry Leicester, who was mysteriously lost at sea on his way back to Australia.

### **Summary**

*The Black Cloud* may be one complex man's colorful wish-fulfillment fantasy filled with surprising introspection and frank sociopolitical commentary that are beyond the scope of this essay, but it's also an exclusive invitation to observe the privileged world inhabited by brilliant scientists, political doctrinaires, and fawning sycophants.

It's also a richly-detailed journey back to the time when thrilling, grand revelations about the cosmos, including the early years of the radio astronomy revolution, resounded inside the theorists' think tanks that were Hoyle's paradises.

How many actual persons from Hoyle's experience appear in its pages can never be confirmed, but it's safe to say that several imminent academic personalities of the mid-20<sup>th</sup> century—Joseph Pawsey prominently among them—led a fictional life among Hoyle's royal court in this gripping yarn.