

## #THERAPY

### Can Radiation Therapy Treat Heart Failure

Radiation therapy may be a potential heart failure treatment



After studying the cardiac effects of radiation in a small number of these patients and modelling the effects of low-dose radiation in mice with heart failure, the researchers found that low-dose radiation therapy appears to improve heart function in various forms of heart failure.

More research is needed before the investigators can evaluate this therapy in patients with heart failure, but the study suggests that radiation's effects on injured hearts with high levels of inflammation may be more varied, and perhaps beneficial, than previously understood.

The study, published in the journal Med, suggests that low-dose radiation therapy improves heart function, at least in part, by reducing the number of inflammatory immune cells in the heart muscle.

"The radiation therapy used to treat ventricular tachycardia is targeted to a specific location in the heart, however, a large portion of the rest of the heart gets a low-dose exposure," says co-senior author and cardiologist Ali Javahri, an assistant professor of Medicine, at Washington University in St. Louis.

A failing heart gradually loses its ability to properly supply the body with oxygenated blood. A complex condition, heart failure can have diverse triggers, including a past heart attack, viral infection, or chronic arrhythmias such as ventricular tachycardia.

The researchers evaluated a group of nine patients with ventricular tachycardia with cardiac MRI, before and after radiation treatment, with the MRIs showing improved heart function soon after radiation.

In particular, the patients' hearts showed improved pumping capacity of the left ventricle, which supplies blood to the entire body. The

improvement was seen a few days after treatment, so, it was deemed unlikely to be due to the reduction of the arrhythmia, which happens more gradually over the ensuing weeks and months.

The researchers also studied the effects of similar low-dose radiation to the heart in groups of mice with heart failure from three different causes.

Similar to what was observed in the human patients, the researchers found improved heart function in mice receiving radiation therapy, especially in the left ventricle. In the mice with progressive heart failure, radiation therapy increased survival of the animals, indicating that improvements in heart function translated to improved survival.

The researchers found that the failing mouse hearts that received radiation had reduced fibrosis, or scar tissue, and reductions in cardiac macrophages, a type of immune cell that can drive inflammation in the heart. In general, the irradiated hearts had fewer cells that proliferate quickly, such as immune cells and fibroblasts, which tend to contribute to worsening heart failure. In contrast, normal heart muscle cells generally do not divide often, if at all.

"We know that rapidly dividing cells, such as cancer cells, for example, tend to be more susceptible to death by radiation," says co-senior author and radiation oncologist Carmen Bergom, an associate professor of Radiation Oncology.

"The effect we see in these hearts is likely more complex than a simple reduction of rapidly dividing inflammatory immune cells. We are continuing our research to delve more deeply into what else may be happening, but we have been pleasantly surprised to see evidence that low-dose radiation in these hearts may reduce inflammation and help remodel the heart in a way that is beneficial."



Maj. Gen Jagatbir Singh VSM (RETD)

robal Dasgupta's first book was *Watershed 1967: India's Forgotten Victory Over China* gave rare granularity into the clashes that were central to India. Regaining control of strategically significant border areas in Sikkim, his latest offering "*Camouflaged*" is another masterpiece in which he has now brought to the fore, *ten forgotten stories* from the battlefield.

The expanse of the book is vast as the stories span over a century from World War I to the 26/11 terrorist strike in Mumbai. From the ground to the air, battlefields, far and near, from dense jungles to desolate mountains and to densely populated urban areas, the settings of each tale varies but what stands out is the character of these ordinary men who delivered extraordinary results, when confronted with extreme challenges. The book also gives a rare insight into the unique camaraderie and ethos of the units, family traditions of military service and more importantly, covers an aspect that is not written about often that is the trauma faced by their families.

Arthur Conan Doyle, bowling off spin in East Bourne to a stylish



The first operational Kuprum bridge at Bayra

Laddie Roy, the other pilot, covered in this story, also came from a privileged background and did his schooling in England. Lying about his age, he joined the RFC. He was told that he had to 'survive and fight and then survive again'. He did survive his first crash and after he recuperated, he 'persuaded the medics to pass him fit for flying duties'. He became a 'war veteran and teen sensation' and took down nine German planes between 09 and 19 July 1918. Unfortunately, on 22 July 1918, the prodigy was shot down in a skirmish but this was after taking down two German aircrafts. He was a trailblazer in combat flying in India and in 1998, a stamp was released in his honour.

## CAMOUFLAGED



India Lal Roy (Laddie) stamp



Colonel Chewang Rinchen

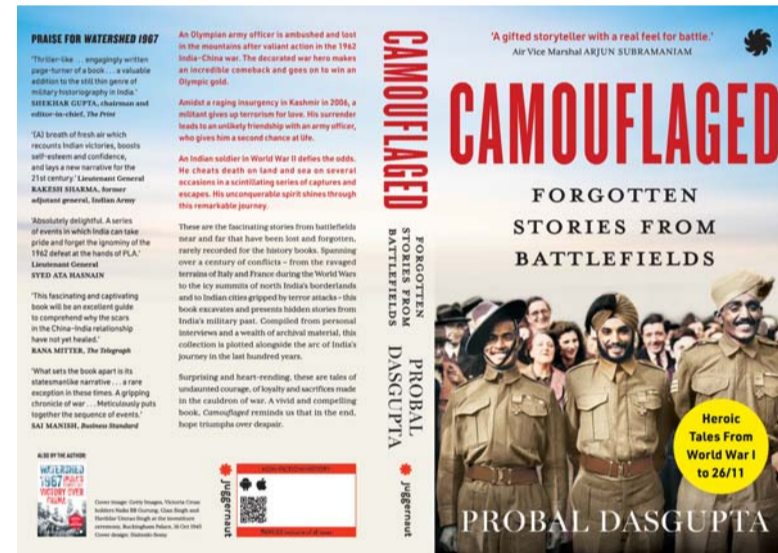


Haripal Kaushik



Haripal Kaushik

## #BOOK REVIEW



after taking down two German aircrafts. He was a trailblazer in combat flying in India and in 1998, a stamp was released in his honour.

"Message In A Battle" is the story of Gobind Singh of 2nd Lancers, a renowned Cavalry Regiment, who was awarded the Victoria Cross in the Battle of Cambrai in 1917. Belonging to Damoi in Nagaur district of Rajasthan, he was fearless. This was the battle where tanks were introduced on the battlefield for the first time but after they had achieved the breakthrough, additional troops in the form of Infantry and Cavalry were

required to follow on and capture the ground. Indian soldiers of the regiment with lances had charged ferociously at German Machine Guns, "raw courage against steel". Though, they had been successful, but they were soon surrounded by Germans and an urgent message was needed to be sent to the Brigade Headquarters. Sowar Job Ram and Lance *Daftadar* Gobind Singh volunteered. Losing his horse, dodging bullets and feigning death, he displayed unshakable composure and resilience, and repeated this feat thrice and this act of 'conspicuous bravery' thwarted a major enemy breakthrough and was awarded the Victoria Cross. His son and grand-

son went on to serve in Second Lancers. The story of Chanan Singh Dhillon, "*Three Lives in War*", can be summed up in the words, 'believe it or not'. A farmer's son from Punjab who was keen to join the Army, fell short of English proficiency to join as an officer. Nevertheless, he joined as a soldier and set off to fight World War II with his Engineer Regiment, initially in Basra, Iraq and later in North Africa, where he became a Prisoner of War (PoW). This was in June 1942, a week before he was to return to India as he had been selected as an officer. Facing an Italian execution squad for complaining against the inhuman work conditions, he was saved by the Germans. While being trans-

ported to a PoW camp in Italy, their ship was hit by a British submarine. Ironically killing many British prisoners, he survived the boiling waters, as S S Loreto went down in the Tyrrhenian sea, by clinging to a plank of wood. Later, while in Stalag 12A, a PoW Camp in Limburg, Germany, he was nearly killed by an allied air attack. He returned and became an officer and his children, then, helped put together the story of his remarkable ordeal based on his diary and letters which were written in Punjabi. Ironically, it all started the day he received the letter, offering him, the opportunity of his dreams.

The legendary tale of *Colonel Chewang Rinchen* has been recounted in great detail, bringing the enormity of his valour, the strength of his character and the adversity of the terrain and weather conditions where he fought. He has participated in all of India's wars and been recognised for his extraordinary bravery and leadership, having been awarded the Maha Vir Chakra, twice. In 1971, he was instrumental in capturing a portion of Balistan, which resulted in the shifting of the *line of Control*. The villagers in this area, though Muslims, reminisced about life before Pakistani occupation in 1948 and felt a greater kinship

## Games Day

hat kind of games do you most enjoy? Board games, card games, or maybe video games? Whatever game is your favourite, this is the day to play it and have some fun for a change! After all, what better break could you take from the stresses of everyday life than to partake in Games Day? As generation upon generation of people, the world over would agree, playing games is a great way to just kick back, relax, and have some fun with your family or friends.



on to become the Pakistani Air Chief, had advised Prime Minister Nawaz Sharif against using air power during the Kargil war as it would have led to retaliatory escalation measures. Many years later, Don Lazarus, then settled in Coonoor, received a reply to his congratulatory letter to Qureshi, in which he complimented him for the fight in Boyra.

Part III of the book covers the 'Modern Era', the Kargil war, insurgency, terrorism and complex modern-day issues. Some stories are still classified in the sense that the names of people can't be revealed but their actions and reactions are fact and not fiction. How do you deal with a militant who admits that he has been led astray, wants to make amends and is willing to help you? How do families support each other in times of crisis knowing fully well that their husbands could be the next victims?

"The *Warriors Code of Courage*" brings out the spirit, training and ethos of 21 Special Forces (SF) and the manner in which they operate. There are two actions of one of their teams which have been covered, one in Assam and the other in J&K. The manner in which an encounter takes place and the interpersonal relations within the team, which is one of the closest relationships with a buddy willingly sacrificing his life for his colleague, brings out the character of these men where inspite of being seriously wounded, their thoughts lie only on successfully completing their mission. The undaunted courage of Major Deependra Singh Sengar who suffered serious bullet injuries in both operations and his colleague, Saurabh Singh Shekhawat who evacuated him both times and is one of the most highly decorated officers, reflects rare bonding and loyalty and fills one with pride.

The dilemmas men face in battling these insurgencies, the effect of intense operations on soldiers, society and people living in insurgency prone areas as well as the onslaught and returned weeks later, absolutely bedraggled. He was shattered both, physically and psychologically but fought back due to the faith of his Commanding Officer, Lieutenant Colonel Karnal Singh Sidhu and amazingly went on to play in the Olympics again, winning his second gold medal in Hockey. A Vir Chakra for his 'remarkable bravery' and Arjuna Awardee, Colonel Haripal Kaushik, known for his speed and stickwork, was indeed an extraordinary human being.

"*Top Guns of Boyra*" is an extraordinary narration which brings out the character of young men, the spirit of a unit and a sense of achievement as well as ethical soldiers' conduct on the battlefield. Flying Officers Don Lazarus, Ganapathy, Soares and Massey of 22 Squadron flying Gnats were successful in destroying two Pakistani Sabres over Garibpur in November 1971. They displayed extraordinary flying skills and became legends 'before they touched down'. One of the Pakistani pilots was Pervaiz Mehdî Qureshi, who was captured by 4 SIKH and saved from being beaten up by their Adjutant Captain (later Lieutenant General) H.S. Panag. Qureshi, a contemporary of General Musharraf went

While the legacy of these brave men is well recorded in their units and by their families but the candid and intuitive manner in which Probal has weaved these tales by infusing life into them, needs to be admired. It's truly a book that is difficult to put down. Probal's gripping narrative brilliantly matched by his eloquent prose while revealing what was hidden under 'camouflage' needs to be admired.

rajeshsharma1049@gmail.com



Chanan Singh Dhillon

## #ASTRONOMY

### Reaching For The (Invisible) Stars

Some stars do not simply die down, but explode in a stellar blast

Supernovae stellar explosions as bright as an entire galaxy, have fascinated us since time immemorial. Yet, there are more hydrogen-poor supernovae than astrophysicists can explain. Now, a new Assistant Professor at the Institute of Science and Technology Austria (ISTA) has played a pivotal role in identifying the missing precursor star population.

Some stars do not simply die down, but explode in a stellar blast that could outshine entire galaxies. These cosmic phenomena, called supernovae, spread light, elements, energy, and radiation in space and send galactic shock waves that could compress gas clouds and generate new stars. In other words, supernovae shape our universe.

Among these, hydrogen-poor supernovae from exploding massive stars have long puzzled astrophysicists. The reason being scientists have not been able to put their finger on their precursor stars. It is almost as if these supernovae appeared out of nowhere.

"There are many more hydrogen-poor supernovae than our current models can explain. Either we can't detect the stars that mature on this path, or we must revise all our models," says ISTA Assistant Professor Ylva Göteborg.

She pioneered this work together with Maria Drouot, an Associated Faculty Member of the Danlag Institute for Astronomy & Astrophysics, University of Toronto, Canada. "Single stars would typically explode as hydrogen-rich supernovae. Being hydrogen-poor indicates that the precursor star must have lost its thick hydrogen-rich envelope."

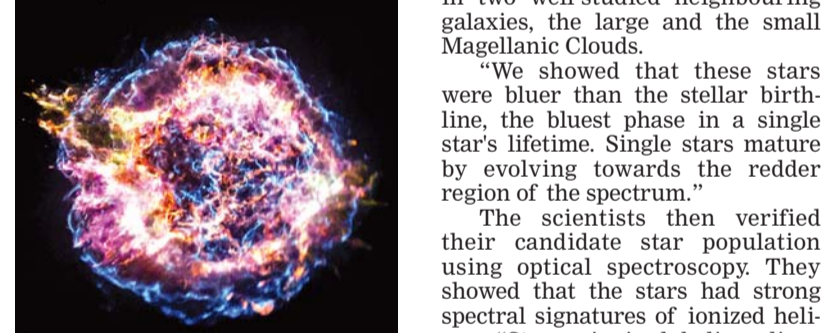
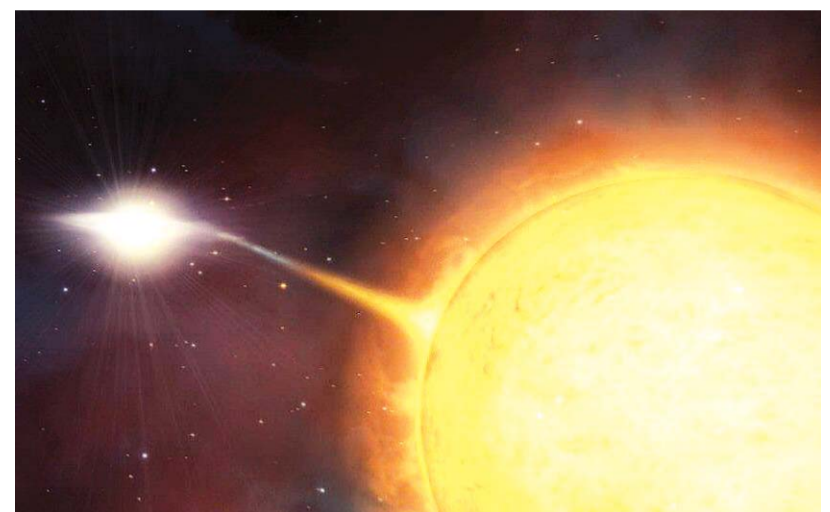
"This happens naturally in a third of all massive stars through envelope stripping by a binary companion star," says Göteborg.

#### Binary Stars and Envelope Stripping

The stars that Göteborg and Drouot search for go in pairs, interlocked in a binary star system. Some binary systems are well-known to us earthlings, these include the brightest star in our night sky, Sirius A, and its faint companion star, Sirius B. The Sirius binary system is located only 86 light-years away from Earth, which is a stone's throw in cosmic terms. This explains Sirius A's observed brightness in our night sky.

Astrophysicists expect the missing stars to be initially formed from massive binary systems. In a binary system, the stars would orbit around one another until the more massive star's thick, hydrogen-rich envelope, expands.

Eventually, the expanding envelope experiences a stronger gravitational pull to the companion star than to its own core. This causes a transfer of mass to begin, which eventually leads the entire hydrogen-rich envelope to be stripped off, leaving the hot and compact helium



core exposed, more than 10 times hotter than the Sun's surface. This is precisely the type of stars that Göteborg and Drouot are looking for.

#### Not just a needle in the haystack

Before Göteborg and Drouot's study, only one star was found to fulfill the expected mass and composition criteria and was called "Quasi-WR" (or "Almost Wolf-Rayet"). "Yet, the stars that follow this path have such a long lifetime that many must be scattered all over the observable universe," says Göteborg.

Did the scientists simply not "see" them? Thus, Göteborg and Drouot drew on their complementary expertise. With the help of UV photometry and optical spectroscopy, they identified a population of 25 stars that are consistent with the expectations for intermediate-mass helium stars. The stars are located

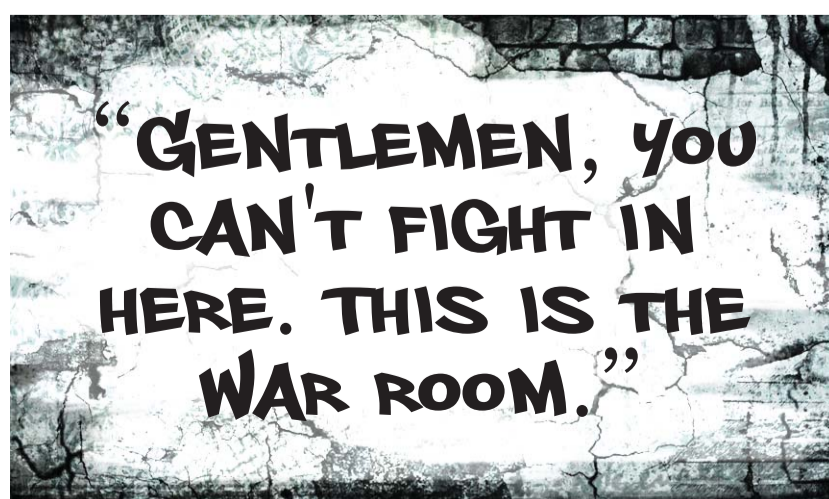
in two well-studied neighbouring galaxies, the large and the small Magellanic Clouds.

"We showed that these stars were bluer than the stellar birth-line, the bluest phase in a single star's lifetime. Single stars mature by evolving towards the redder region of the spectrum."

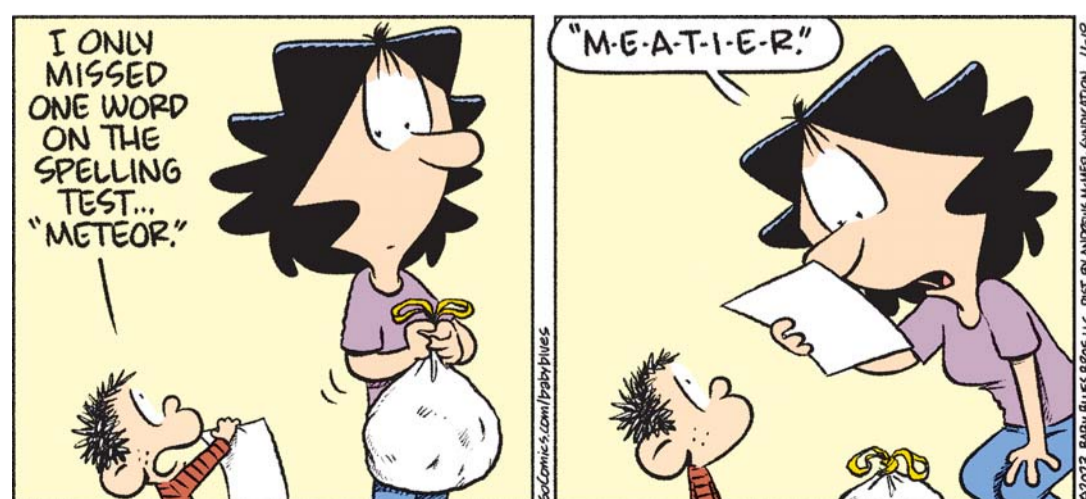
The scientists then verified their candidate star population using optical spectroscopy. They showed that the stars had strong spectral signatures of ionized helium. "Strong ionized helium lines tell us two important things: first, they confirm that the stars' outermost layers are dominated by helium and, second, that their surface is very hot."

"This is what happens to stars left as an exposed, compact, helium-rich core, following stripping," says Göteborg. Yet, both stars in a binary system contribute to the observed spectra. Thus, this technique allowed the researchers to classify their candidate population depending on which star contributed the most to the spectrum. "This work allowed us to find the missing population of intermediate-mass, stripped helium stars, the predicted progenitors of hydrogen-poor supernovae. These stars have always been there and there are probably many more out there. We must simply come up with ways to find them," says Göteborg. "Our work may be one of the first attempts, but there should be other ways possible."

## THE WALL



## BABY BLUES



By Rick Kirkman & Jerry Scott



## ZITS



By Jerry Scott & Jim Borgman