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Into That Silent Sea
Trailblazers of the Space Era, 1961–1965
By Francis French and Colin Burgess
University of Nebraska Press

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Introduction

One momentous event begins this book, and another closes it. In April 1961 a human being rocketed into space for the first time, and in March 1965 another human floated out of a spacecraft on the first-ever spacewalk. The technological, political, and cultural momentum behind these two historic events, and the steps taken in between them, have already been well chronicled. This book certainly makes reference to these broader stories; it does not attempt to explain them.

Many books about this period of rapid spaceflight advances have described the space programs of the world in grandiose, lofty terms. Without doubt, enabling a human to leave the confines of Earth's atmosphere for the first time was a defining moment in human evolution, a bold step into a wider universe and understanding of our place within it. Space exploration has added to the general body of human knowledge, allowing us a new and remarkable view of who we are as a species and where we live. Today, it is almost impossible to imagine a time when we saw the Earth as the limit of our reach or when we had not seen photographs of our planet from above the atmosphere.

Into That Silent Sea describes in vivid detail the key moments when such visions of humankind's future and place were first realized, but it does not seek to give an overall view of what we have learned from flying into space. That is left to the large body of authoritative works on the subject. There are also histories that examine our push into space in the 1960s from a far more down-to-earth perspective. Undeniably, the pursuit of technological advances and achievement in that decade was due primarily to Cold War politics and national prestige. Both played an integral role in explaining the rapid advance of the so-called space race and why it stagnated when the decade was out.

Other authors have chronicled the timing that allowed innovative and even daring technology, ever-shifting global politics, and key political deci-

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sion makers to come together in perfect symmetry, setting in motion a race to the moon between two resolute and unsubmissive superpowers. These events form a fascinating backdrop to the story, but the reader must seek the full details elsewhere.

What then is this book about? The answer is simple—it is about people. In particular some extraordinary people who, during that amazing era, found themselves propelled into space on top of unreliable rockets, ready to take a decisive step into a largely unknown realm. The massive and hugely expensive effort to hurl them into space on missions of rapidly escalating complexity was sustained by some extraordinary engineering technology, most of which was on the very leading edge of what was technically possible.

These pioneering space explorers ranged from test pilots to medical doctors, from spacecraft engineers to a textile mill worker, from backgrounds both military and civilian and from ages ranging from the early twenties to the first clutches of middle age. Most were engrossed in pursuing other careers when a fortunate combination of luck and good timing put them in the right place at the right time, and with the right qualifications. This book does not seek to mythologize them as Cold War warriors or as representatives of a new era in human evolution. It does not attempt to denigrate their achievements by questioning the costs associated with the space program, either in lives or in national budgets. Instead, it looks at their lives as people: who they were and what happened to them as they stepped voluntarily into mankind's greatest ever technological and scientific undertaking.

As Yuri Gagarin, the first person to travel into space, once said: "There is more than a bit of romance in being a space traveler, but by now we all know that the path into space is not strewn with roses. And those who have taken this path are not fanatics, robots or cogs in the cosmic mechanism, but brave and determined people. In each of them there is something unique and peculiar to them alone." From Gagarin onward, the astronauts and cosmonauts were always the first to tell interested admirers that their participation was just one facet of the space program. Supporting them were rocket designers, engineers, agency chiefs, and thousands of others who made the biggest decisions, and without whom there would have been no space program. Some of these individuals' stories are also told in this book, many for the first time, but the focus is always on those who flew the rockets. Whether the astronauts and cosmonauts were the most important or

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influential people in the space race is not the point; they were the people who willingly climbed into a spacecraft, accepted the odds, and risked their lives to pursue a dream. They underwent an experience that could not be fully predicted or imagined until it actually took place.

Where possible, both authors have talked directly with the space explorers from this era, their families, and others who knew them best. Memories of decades-old events can sometimes be hazy, and it is also a common human trait to want to tell a story in the way we'd like it to be remembered. The authors, however, wanted to step aside and allow these spacefarers to recount their stories through their own, often vivid, memories.

Every effort has been made to check each transcript against verifiable facts, and readers accustomed to official space agency accounts of these spaceflights may question a few surprising details. During interviews, several spaceflight veterans pointed out where official accounts of their missions were in error. The authors have chosen to transcribe and relate their stories in the same good faith in which they were given. This is by no means the first book to cover these flights, yet the subjects candidly told us many stories that have never before been recounted in print. Some will even come as a surprise to those who flew with them.

The reader will share the experiences of an unusual cross-section of highly motivated individuals. For the most part, they had the same strengths and failings as the person next door, but these men and women became part of an extraordinary and unprecedented undertaking. The space program changed the lives and philosophies of some; others used their newly acquired influence to change the space program more to their liking. A few fell victim to internal office politics or misplaced perceptions and prejudices. Others found that the respect and affection afforded to spacefarers were a way to reach even greater prominence and importance. Some left their space careers behind them and moved on completely. Others could not.

Whatever became of them, these pioneers of spaceflight history were the ones who did these extraordinary things, who went farther than humans had ever ventured before.

They were the first to fly—ever higher, ever longer, ever faster—into that silent sea of space, the new frontier.

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1. First to Fly

I saw Eternity the other night,
Like a great ring of pure and endless light,
All calm, as it was bright

Henry Vaughan

When venturing into the unknown, the first step taken is often the biggest and the boldest. A young Russian pilot named Yuri Gagarin took humankind's first step into space. He died in his mid-thirties, so his image is fixed: a youthful icon symbolizing the first human journey above our planet. As President Lyndon B. Johnson wrote, "Yuri Gagarin's courageous and pioneering flight into space opened new horizons and set a brilliant example for the spacemen of the two countries."

Like many others who are remembered more for what they did than for who they were, Gagarin's life was far more complicated than the smiling photos in the history books would have you believe. "Gagarin is often spoken of as if he were an absolutely straightforward and simple person," his cosmonaut colleague Konstantin Feoktistov once said. "In fact, he was not at all as simple as it might seem at first glance."

Gagarin's life was tragically brief, yet he experienced more than most people ever will. His sudden and almost unprecedented fame brought its share of negative consequences, putting his basically honest and positive character through some severe tests. Yet he died while still trying to push his own personal development; despite numerous setbacks, he never gave up. It is not surprising that he had this strength of character considering he was lucky to survive his own childhood.

Anyone seeing the eleven-year-old Yuri Gagarin, just sixteen years before he made his historic spaceflight, would never imagine that he would be the

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one. The impish and mischievous young boy was a compulsive prankster, and his rudimentary schooling consisted of lessons culled from scavenged military maps and manuals left behind from a war that had devastated his homeland. It would scarcely have been possible to meet the ragged farm boy in 1945, living in a rural house made from the salvaged ruins of an earlier war-damaged home, and believe that in a few short years he would be flying a technological marvel. It would also have been difficult to imagine that his home country, shattered to the core by a ruinous war, could rise to such technological heights so quickly. Yet Gagarin and Russia pulled themselves out of the devastation and carried out one of mankind's greatest achievements.

Yuri Alexeyevich Gagarin was born on 9 March 1934 in Klushino village, near the eastern edge of the USSR's Smolensk region. Though the Gagarin family worked on the local collective farm, they had not always been farmers. Yuri's mother, Anna, had grown up in the big city of St. Petersburg and brought some of the city culture to her family's otherwise rural life. Yuri was the third of four children, and his mother ensured that her children either read or were read to every bedtime. "To this very day," Anna later wrote, "if I have an interesting book, I prefer to read it all night rather than put it down halfway through." The cosmonaut described his mother as a "well-read and well-informed person. She was always ready with an answer to her children's endless questions. I owe her everything I have achieved in life." Yuri learned to read by watching and listening to his older siblings doing their homework. In a village with no electricity, no running water, and only one radio, where much of the time was spent tending animals, the Gagarin children grew up with a slight educational edge over many of their peers.

Yuri's father, Alexei, was a carpenter. He maintained the collective farm's buildings and had built the family's house by hand from boulders and pine logs. His life had never been easy; his own father had been an alcoholic who often beat his mother before finally leaving for good when Alexei was four years old. This meant Alexei had never had much of a school education; he'd worked since childhood as a shepherd, providing a vital cash flow for his mother. "His entire education consisted of two years' schooling," according to Yuri, who described his father as "strict, giving us our first lessons in discipline and respect." Alexei did not value school education for his

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children, but did encourage his sons to develop practical skills. Yuri grew up around his father's tools and absorbed the concept of precise technical expertise. He was so used to being around carpentry that the young boy learned to distinguish different types of wood by smell alone. His father encouraged his interest and hoped that all three of his sons would one day work with him, as a team of carpenters.

Despite having parents who cared for him in their own very different ways, Yuri's childhood was neither happy nor easy. When the boy was seven years old, Hitler declared war on the Soviet Union. Anna cried when she heard that the country was at war; she remembered the suffering of World War I all too well. Yet even she could not have imagined what was to befall the family.

In 1941 the Nazis advanced rapidly into the Soviet Union, pushing deep into the country and capturing the areas near Klushino. "The war came nearer and nearer," Yuri remembered, "like the rising water at flood-time, until it reached our region." The advance was temporarily halted when, caught unprepared by the Russian winter, the invasion force was forced to gradually retreat. Those in the village able to fight left to join the army, taking the most valuable farm equipment with them and leaving the women, elderly, and children to run the farms. Soon, however, the precious animals were also taken deeper into Russia in the hopes of saving them. The front line of combat pushed forward and back across the Smolensk region, and was soon sweeping around Gagarin's village. There were battles in the surrounding woodlands, and Klushino's prominent landmarks were shelled.

Gagarin's older brother Valentin, too young to be a soldier, was put to work digging trenches around the village, but such efforts would not be enough to slow the invaders. Refugees soon appeared, pouring through Klushino to make their way to safety, drinking from the Gagarin family well until it ran dry. Retreating civilians were soon replaced by retreating Russian soldiers, who ate what was left of the farm supplies. Reports arrived in the village with increasing frequency of sons, fathers, and neighbors killed on ever-closer battlefields. It was an abrupt end to the innocence of childhood for young Yuri, who saw the cruelties of war played out in front of him on a daily basis. It was also, Valentin believed, when Yuri learned perseverance, courage, and the strength to risk his life for others.

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Alexei decided that his family should flee the area too, but by the time they had packed up their belongings it was too late; the village was surrounded by German forces. By the end of 1942 Klushino was occupied by the Nazi invaders, who showed no hesitation in killing any civilians who offered resistance or otherwise questioned their authority. One particularly brutal German officer hung Yuri's younger brother, Boris, from a tree to die; Anna managed to save her child just in time. "We took him back," Yuri recalled grimly, "and with great difficulty brought him back to consciousness." Boris could not walk for a month, and his sleep was filled with nightmares. It may be that he never fully recovered; years later, he took his own life by hanging.

Boris was not the only family member to suffer under the foreign occupation. Anna's legs were badly scarred by a German soldier with a scythe, and when Alexei tried to sabotage the mill he had been put to work in he was beaten so badly he was permanently disabled. The entire family was forced out of their home by the soldiers and had to dig themselves a primitive shelter to live in. The shelter was never a safe place, with bombs shaking it until the dirt roof was ready to cave in. Valentin later said that he did not remember seeing his father smile during the entire duration of the war. The boy had little reason to smile himself; the Nazis put him to work as a manual laborer with the promise that he would be shot if he did not work hard. By 1943, Valentin and Yuri's sister Zoya had been taken by the SS to a slave labor camp in Poland. Luckily, both managed to survive the horrific living conditions long enough to escape. Finding their way to the Russian army lines, they were pressed into military service. Both survived the war, but their parents would not know this until the conflict was over.

With the Nazis using the village as a base, Russian forces repeatedly shelled the area, keeping the family constantly on edge. "We lived in fire and smoke," Yuri said of that time. "Day and night, something nearby was on fire." The Gagarins scavenged in the muddy fields for whatever food might have been overlooked, digging for the buried remains of rotting crops, surviving mostly on thistle root and sorrel soup, constantly hungry.

Despite the ever-present possibility of capture and death, Yuri and the other village children did what they could to disrupt Nazi war efficiency. They placed nails and broken glass on the road to burst army vehicle tires, stuffed potatoes and rags in exhaust pipes, and poured soil into tank bat-

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teries. "During the war, we boys felt powerless," Yuri remembered. "We did everything we could to annoy the Germans." It was risky, but it made Yuri feel like he was doing something to resist the invaders.

One dramatic event during the war had a particularly profound effect on Gagarin. An aerial dogfight over the village resulted in the downing of a Soviet fighter, which attracted a second pilot in a rescue aircraft. Yuri and Valentin were soon on the scene, along with other children. Valentin helped the pilots salvage the usable parts of the aircraft, while Yuri brought them some food. Young Yuri was fascinated by the two fighter pilots and spent as much time as he could with them before they left in the rescue airplane. He admired their medals, took pride in looking after their map case, and was thrilled when one of the pilots put him in the downed fighter's cockpit and showed him the controls. Meeting the pilots, only one of whom would survive the war, was a memory that stayed with Gagarin and changed the course of his life.

At long last, in spring 1944, the front line of the war came through the region again, and the Nazis were driven out for good. What they left behind, however, was a shattered village, its fields still peppered with mines, in a devastated nation. Almost everything of worth had been destroyed, and livelihoods had been utterly disrupted. The family hunted for edible mushrooms in the forests, the need for food outweighing the dangers of unexploded mines. With no animals left in the village, the women had to pull the ploughs themselves and plant what few seeds they had, hoping for a successful harvest. "Every one of us had seen the horrors perpetrated by the occupants," Yuri later recalled, "and had suffered the torments of hunger and oppression; we knew what war meant." The Gagarins would have to live with the memories of the horrors they had experienced and begin anew.

The family moved to nearby Gzhatsk in the spring of 1945 and built their own house by hand from the ruined remains of their former home. Gzhatsk was as pulverized as Klushino. "The charred remains of brick ovens loomed on both sides of the ruined road," Valentin later vividly described, "criss-crossed with ugly, water-logged ruts." As part of the rebuilding, the townspeople decided that it was important to construct a school. Yuri's schooling had ended during the long years of war, and now there were no materials left to learn from. He was, however, enthusiastic and willing to learn, and with the help of a volunteer teacher regained some of the years of learning

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he had lost. Pieces of old wallpaper and paper bags found in empty German bunkers were used as crude writing paper, while discarded flares were opened and their contents used to make ink. Without desks or chairs, the children improvised using long planks.

Yuri was still a mischievous boy who delighted in teasing his younger brother and soaking his sister with cold water. Yet he was also very bright; his tricks usually stopped short of annoying adults too much. Sometimes, his behavior did go too far; on one occasion, a paper airplane he made and threw from a classroom window broke a stranger's glasses. This incident did however demonstrate a new interest of his—flying. Before the war he had enjoyed making kites out of newspaper, but now Gagarin had become fascinated with making model aircraft, and he dreamed of flying a real airplane, just like the Soviet fighter pilots he had met in the war.

As Yuri grew older, what remained of his mischievous side seemed to anger Alexei all the more. His father resented Yuri's efforts to escape the limitations of rural life. He walked out of his son's school recital because he felt that Yuri was showing off; leaving would teach him a lesson about being too boastful. Alexei also hid his son's boots to stop him from playing hockey at school, exasperated that his son was wearing out boots faster than other family members. As Yuri later wryly commented, his father was "never effusive in his tenderness." Valentin agreed that their father was "not one to be crossed," the type who would quickly fly into a rage when upset.

Alexei had already made Yuri his own set of carpentry tools and grew annoyed when one of Yuri's teachers suggested the boy could do well in other careers. The stubborn father would grumble to his wife that the schoolteachers were filling his son's head with crazy dreams and ambitions. His sons should settle for the steady, safe job of carpentry, he thought; there was still much postwar rebuilding to be done in the area. No one could make him change the views that had guided him through his difficult life. "It was difficult to argue with him and useless to disagree with him, for he would rarely concede a point," Valentin later reflected. It is not surprising therefore that Yuri grew more and more eager to stay away from the house. His excuse was that he was studying nature, and he spent his free time collecting stones and grasses. He was also collecting picture postcards of Moscow and imagined traveling to the big city. His father had told him that, as soon

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as he had completed his basic schooling, he was to come along on carpentry jobs. That was the last thing Yuri wanted to do.

Yuri thought deeply about which career he wished to follow before it was too late and the decision was made for him. One night, he announced to his parents that he was not going to stay in the village and settle for being a carpenter; he was going to enroll at a college and try a different career. He wasn't sure what he wanted to do, but he knew he didn't want to stay at home any more. His mother began to cry. Having lost two of her children for so many years during the war, she did not want to let another one go. His father walked out of the room without saying a word. "They felt that I was a small child," Yuri later said of that turbulent time, "even though when they were my age they were already working like adults."

Eventually, his father tried to compromise, asking Yuri to complete one more year of village school before leaving. He hoped that, in that year, the boy would change his mind; he was, after all, only fifteen years old. But Yuri was not to be dissuaded, and made plans to leave town as soon as possible and stay with an uncle in Moscow who'd be able to help him obtain a college placing. As Yuri left home, his father's last instruction was a stern warning not to disgrace the family name.

Yuri decided to become a gymnast, but when he applied to the appropriate college all of the places had been taken. He did find an opening at the apprentice school of a steel mill in Moscow, where he could learn to be a foundryman, a trade that he imagined he might do for the rest of his life. It was difficult work, especially as he was small in stature, but he worked hard to learn and improve. Living in a big city was also a culture shock for the country boy, who had never seen so many people bustling around him before. But escaping from village life seems to have been exactly what Gagarin needed. He did so well in his studies that by the end of his first year he was selected to train at the Saratov Industrial Technical School. Here, he would learn all about agricultural machinery. By this point, he had won the opportunity to attend a physical training technical school and pursue his gymnastic ambitions, but he chose Saratov as offering a more realistic career. More important for Gagarin's future than the academics, however, was another attraction of the Saratov area: on the outskirts of the large industrial town was an airfield with a flying club.

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As soon as Gagarin was permitted to enroll he joined the club. It would be a chance to see whether his childhood dreams of flying like the wartime fighter pilots matched the reality. His first flight, in a Yak-18, was all he had hoped it would be, and more. All the agonizing about becoming a carpenter, gymnast, or foundryman was now irrelevant. Even before he had landed, Yuri had decided that flying was what he really wanted to do with his life. It was going to be hard, however, to find the time to fly when he was still studying at school. Both the flying club and the technical school required long hours of academic study. After many months trying to do all of the studying simultaneously, Gagarin realized that it was time to make the giant leap. He chose to become a pilot, and in October 1955 he enrolled as an aviation cadet.

Yuri's father, once again, was displeased. After spending years in the village school, then studying as an apprentice, Yuri was now changing careers once more, and Alexei accused his son of wasting his country's money on training that he was now prepared to cast aside. He was, however, quietly proud of his son's stubbornness in pursuing his own goals and grudgingly impressed that his son had flown an airplane. The idea of flying a machine off the ground seemed unreal to the old man, something he could never imagine doing himself. For Alexei, technological marvels such as propeller-driven aircraft were part of a different world than the familiar Smolensk farmland.

Yuri's flying instructor grew so impressed with Gagarin's natural ability as a pilot that he recommended him for the military piloting school at Orenberg. This meant that Gagarin had to enlist in the military, but in return he would be able to dedicate himself to flying, with tough instructors to push him to even greater levels of skill. At Orenberg, however, he would just be one of many promising pilots—nothing special. He practiced hard and did well, though at first he found making smooth landings difficult. Eventually he determined that this was due to his height; he was too short to see the runway properly. He began sitting on a cushion while flying, and his landings improved dramatically. Years later, when Yuri was a household name, his flying instructors struggled to recall their former pupil. He'd been a proficient trainee pilot, but certainly not outstanding enough for them to remember.

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One night at a school dance, he met a young girl called Valentina, who also worked on the base. "She was timid and shy," he said of that first meeting. Valentina, reflecting on that evening, remembered Yuri being one of many cadets, "shaven-headed, fidgety and excited." She was in fact more interested in the boys of the senior class, as were most of the girls. Not only did they look more serious, they also had hair, which made them far more attractive. Still, she enjoyed Yuri's simplicity and plain manner. He seemed genuinely interested in her, telling her all about himself and asking her question after question. He was not sophisticated, but he was honest and open—and a confident dancer.

Gagarin was not her idea of a perfect boyfriend, but Valentina found herself intrigued by the self-assured young man. For his part, he found himself falling quickly for Valya, as everyone called her, and also found her family just as inviting. As he was in a strange town, he greatly enjoyed spending time at her family home, where he was treated like a son. Valya's father was a cook, "by nature a very hospitable man" according to Gagarin biographer Nikolai Tsymbal, and Yuri reveled both in his company and his food. Yuri later said, "They were very warm towards me . . . I always felt completely at home with Valya's family"—perhaps more than he ever had with his own.

Yuri and Valya married in Orenberg a year after they met, in October 1957. Alexei refused to allow the Gagarin family to attend. According to tradition, marriages took place at the groom's family home, and Alexei was annoyed at his son for flouting this custom. He'd also hoped Yuri would finish his studies before marrying, having recently told him to "learn to make a living first, and only then have children." Yuri, it seems, paid little heed to these words. "My father mentioned his disapproval of our having celebrated the wedding in Orenberg and not in Gzhatsk," he later recalled. "I knew my father's character, knew that he brooked no contradiction, and so I kept quiet." Yuri also paid little attention to the launch of the world's first satellite that month; he was too caught up in his own wedding preparations and his final piloting examinations. "I was probably more occupied by how to seat all the friends we had invited to our wedding feast than by anything to do with the moon," he recounted. He did, however, wonder briefly about how long it would be until people would fly into space. He guessed that it would take another ten years.

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Gagarin's first posting as a pilot was with a fighter-interceptor squadron based in the village of Luostari, in the North Murmansk district within the Arctic Circle, where he flew reconnaissance missions. Initially, to his frustration, he was not allowed to fly at night—and the polar night could last for six months. Valya had to make do with the gloomy room they were borrowing from a friend; there were no married quarters. "At first Valya could not get used to northern nature, the frowning, drizzling sky, and the dampness," Yuri remembered. "She would wake up in the middle of the night seeing that it was light outside, as though it was daytime." The couple endured heavy snowstorms, blizzards, icy winds, and, when the weather warmed a little, relentless rain. "Yuri's duties took up a great deal of his time," Valya recalled later, "but he tried to find an hour or two for me, the house, the family." It was an uninviting place for the newlyweds, but it was where their first daughter, Lena, was born in April 1959.

A few months later, all of the major air stations in the western regions of the Soviet Union received a visit from teams of officials. They asked many questions of the pilots, and it seemed that they were recruiting for some special project, but they did not say what it might be—not yet. Gagarin was one of those questioned, and as the number of people being asked to attend these closed-door interviews shrank from over three thousand down to around two hundred he was still among them. Together with the remaining candidates from around the country, Gagarin was ordered to report to Moscow for medical tests, and only at this point was he told the purpose behind them. The tests would determine who would become the nation's first cosmonauts. In Moscow he underwent many trials and examinations, which included being whirled around on strange-looking devices, talking with psychologists, and taking aptitude tests. His eyes were tested for night vision, squinting, color blindness, and any other slight imperfection. He was vibrated, subjected to changes in temperature and pressure, and spun on a centrifuge. Psychiatrists asked probing questions and tested his concentration. "The medical board was stricter than anything I had known before," Yuri remembered. "It was nothing like the usual air force medical examination that we went through every year. There were many doctors, and each of them was as strict as a prosecuting counsel."

Of the 154 pilots examined, 20 were finally selected, while the others were sent back to their units to continue their piloting careers. Yuri Gagarin was

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one of those who had passed the grueling trials. Without ever really choosing to be, he was now a cosmonaut. He was under strict instructions not to tell anyone else about his new assignment for now, including his wife. He instead told Valya that he had been chosen as a test pilot for a strange new flying vehicle. In a sense, it was not a lie.

The Soviets had thought about selecting submariners and mountain-climbers as well as pilots to be cosmonauts, considering them all to have the skills necessary to fly in space. Jet pilots under thirty years of age were eventually chosen, however. Not only was their training the most directly applicable; they were also trained parachutists and cleared in security screenings and fitness tests. It was believed that their occupation would require emotional and nervous stability, as well as strong willpower. Yevgeny Karpov, the medical doctor who became the first head of the Cosmonaut Training Center, later explained: "it was decided that paramount importance was to be placed on the intellectual scope and physical staying power of those chosen." None of the cosmonauts chosen were test pilots, but they were quite adequate for the spaceflights to come.

In March 1960, Gagarin moved with his family to the Moscow area. A brand-new and secret training facility, known as Star City, was being built for the cosmonauts in the middle of a forest outside of town. In the meantime, they would train at various scientific institutions around Moscow, and even at a Moscow sports club. As well as aviation medicine and rigorous parachute training, they also began an intensive physical fitness regime. The trainers soon realized that this was not going to be enough. It was important to motivate the group in other areas and not just let them feel they were medical test subjects. Classes were added in spaceflight theory. "It was an extensive program," Yuri stated. "We had to study the fundamentals of rocket and spacecraft technology, spacecraft design, astronomy, geophysics, and space medicine." As the cosmonauts and the program were both starting from similar levels of inexperience, some training elements were added as they were conceived. "On the whole," Gagarin later said, "it was a case of the blind leading the blind."

Just like their American counterparts, the team of pilots bonded closely as a cooperative group, despite their competitiveness to be the best. Unlike the *Mercury 7* astronauts, however, they were not known to the pub-

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