CHAPTER 1

The Bomb in My Garden

I emerged from my daughter's home the morning of April 10, 2003, to find the city of Baghdad in a state of total anarchy. Two days of ferocious battle during the American invasion had left carnage and confusion in its wake. Intermittent gunfire and explosions echoed through the city. Columns of smoke from burning government buildings rose into the sky across the horizon. The smell of sulfur and toxic gases released from the fires permeated the warm morning air. A sense of jittery calm settled on the residential streets of my daughter's neighborhood.

A few neighbors crept out of their homes to look at the two houses down the block that had been destroyed by American artillery two nights earlier. The structures lay half in rubble. A small crowd stood shaking their heads over the tragedy, but no one seemed to know whether anyone had been killed in these homes. On the street corner, the charred remains of two Iraqi military trucks stood like twisted sculptures of war, their frames blown apart and partly melted. Nearby, a group of teenage boys bent over the severed arm of an Iraqi soldier lying in the gutter.

The body to which it should have been attached was nowhere to be seen.

One of my daughter's neighbors, a middle-aged man I didn't recognize, came to me and asked after the welfare of my family.

"We are all alive and safe, thanks be to God," I said. "And yours?"

He was extremely agitated and said he was not sure. Telephone service was cut throughout Iraq, and he had no news of his eldest son's family, who lived in the northeastern section of the city. He was desperate to drive across town to find them.

"Do you think it is safe to make the journey?" he asked.

"I don't know," I said. "Things seem very unstable, but perhaps if you proceed cautiously, it will be fine. I hope to take my family back to our own home, too."

Leaving my wife and daughters in the house, my son Zaid and I drove west toward the al-Ghazaliya quarter to see whether our house had survived the combat that had engulfed our neighborhood. As we approached the commercial area around the University District, the roads were so littered with wreckage and destroyed vehicles it was difficult to navigate. The pop of gunfire echoed off the walls, and I could feel the adrenaline rising in my neck. Traffic lights were dead, along with the city's electricity, and drivers recklessly careened toward each other, ignoring rules of the road and eyeing each other with apprehension.

I looked out the passenger window in shock at the obscenity of the wreckage. Next to a white minivan with bullet holes in its windshield lay the bodies of two men in bloodstained white robes, their faces black and swollen with death. Zaid swerved around the corpse of a donkey that had fallen in the road, pockmarked with shrapnel wounds. Its four legs, stiff with rigor mortis, pointed at the passing cars as though accusing them of the outrage.

Reaching the commercial district, we now saw plenty of ordinary citizens in the road. Scores of men scurried across the street carrying looted furniture on their heads and electrical appliances under their arms. They looked wild, as if delirious. Young men disappeared inside the smashed-in storefront of a computer shop and came out

with armloads of equipment and anything else of value. Several cars drove past with trunks open and bulging with stolen goods. A few blocks further along, the owner of a bicycle shop stood guard outside his property armed with a rifle. On side streets I noticed residents setting up roadblocks to the entrances to their neighborhoods using chunks of debris, palm fronds, and broken bottles.

"What is this?" I said to Zaid. "What is happening to these men?"

I was momentarily overcome with shame. As an Iraqi who is proud of his people, I could not believe this behavior. Baghdad was a place of civilized people, not looters. It was as though the sudden removal of the Saddam regime had induced a temporary madness.

We drove down Al-Nafaq, the tunnel road that led to one of the large intersections of Baghdad. A giant mural of Saddam Hussein stood in the middle of the traffic circle. As we drew closer, I could see a group of men dressed in black and heavily armed with automatic weapons and rocket-propelled grenade launchers: members of the Fedayeen Saddam, the fiercely loyal personal militia of the president. I stared at them in disbelief. It seemed impossible that Fedayeen fighters could be at this intersection. The Americans had swept through the district during the invasion and couldn't be far away.

The Fedayeen had spread out across the roundabout and were using their weapons to wave traffic around the circle. Their faces looked hard but weary from days of heavy fighting. Two of the militiamen leaned against the portrait of Saddam as though in the absence of the president to protect, they would make their last stand defending only his image.

Zaid and I sped three quarters of the way around the traffic circle and onto the entrance to the Abu Ghraib Expressway, leading to our neighborhood. As soon as we made the turn, my heart froze. Less than two hundred meters away, a column of American armored vehicles was headed directly for us, taking up all three lanes in the wrong direction. We were trapped.

I glanced through the rear window. I was certain that any moment the Fedayeen fighters would hear the approaching convoy and we would be caught in crossfire. Zaid and I looked desperately

for an exit from Abu Ghraib Street as the American column grew closer. Their cannons pointed directly at us. We were seconds away from annihilation.

"Over there!" I shouted.

Zaid veered off an exit to our right onto a small byroad parallel to the main street. Seconds later the tanks roared past us, and the shooting began. The first heavy round shuddered through the air, followed by staccato machine-gun rounds. A grenade exploded somewhere behind our car as the Fedayeen Saddam fighters returned fire. Terrified that we would be hit by stray bullets, we turned onto a residential side street, drove a hundred meters, and parked. Only a half mile from the battle, we heard the constant spray of gunfire with only short pauses in between. It seemed too close, so we drove another hundred meters down the road.

For fifteen minutes the air was torn apart by the cracking sound of gunfire. I imagined the Iraqi fighters scrambling for cover, hopelessly outmatched by the American armor. Finally, the shooting came in spasms. Then we heard mostly silence, broken by infrequent bursts.

"It is getting less now," I told Zaid. "Let's move on."

As we turned onto the byroad, I looked back and saw many American vehicles parked at the intersection, but no soldiers. The Americans must have pursued Saddam's militiamen into the surrounding streets. Later we were told that eleven Fedayeen militiamen had been killed there.

Further west, the Abu Ghraib Expressway was eerily deserted. Normally, it was one of the busiest roads in Baghdad. Now it felt dead, as though the Americans had turned it into a ghost highway.

On the road to our house, spent bullet shells and debris littered the pavement like gravel, proof that our quarter had seen heavy fighting. When we arrived at our security gate, we could see that our five-bedroom house was intact. I unlocked the front door and Zaid and I went room to room, methodically checking for signs of damage. A water glass lay shattered on the kitchen floor, presumably having fallen due to the force of nearby explosions. One window was cracked. Otherwise our home seemed unscathed.

I stepped out into our walled garden, which had been my place of refuge during the years I spent as Saddam Hussein's nuclear mastermind. I am probably overzealous in my gardening, which I approach with a typical engineer's eye for the straight line and the perfect detail. I surveyed the yard for flaws. The date palm next to the fence looked fine. A single young mango still hung from the little mango tree, and I expected it would ripen within about three months. I lingered over the lime tree, whose sapling I had bought years ago from a hothouse in Holland while searching for the secrets of uranium enrichment during the 1980s. The tiny citrus flowers had survived the war and would soon become fruit. The Indian berry vines, grafted from cuttings I had gathered on a trip to Bombay, were in good shape. Around our kidney-shaped lawn, the gardenias were in full bloom.

The dichondra grass, with its delicate round leaves, was already drying out in the hot Iraqi sun and badly needed watering. I noticed several places along its border where the lawn had overgrown my careful hedging. A few pieces of debris littered the lawn, including a cone-shaped gray object about a foot long, which I didn't recognize at first.

I turned the corner into the side yard and saw that something was amiss with the metal rack where I kept my gardening tools. It leaned sideways and its tin roof had collapsed and curled around something. Coming nearer, I was stunned as I realized that an unexploded missile poked through both sides of the destroyed shelving. Could that be? Yes, there was no doubt. Thin, but more than two meters in length, it would have been taller than I am if stood upright. I calculated the base as roughly 25 centimeters in diameter. It was whitish in color. I noticed the fins halfway along its sides had chipped off. The front end was blunt, as if the nose cone had come off.

I knew right away that it was an American bomb, because it was completely unlike anything in the Iraqi arsenal. I didn't know much about American missiles, but with my many years directing Iraq's nuclear program, and then as one of the directors of Saddam's military-industrial complex, I was very familiar with rocketry in

general. Its length suggested it had been launched from the air. A bomb of this size would obliterate everything within at least a fifty-yard radius, probably much more, including my entire house and garden. I quickly discarded the notion that it had been aimed at my home. The Americans had no reason to target the home of a scientist, and even if they had, I doubted they would have known where I lived. The bomb must have been aimed at a nearby Iraqi military position.

Its front end had come to rest just a few feet from the wall of my daughters' bedroom. I shuddered as I tried to calculate the mathematical percentages of the two factors that had favored our survival. The split-second decision I had made on April 8 to spend the night of battle away from home had been nearly fifty-fifty. I didn't know the probability of a missile failing to explode on impact, but figured it was low. If both factors had gone the other way, though, we would have been obliterated in a millisecond. Suddenly it dawned on me: the object on my lawn was very likely its fuse.

I stood looking at the missile for a few moments before I was struck by the incredible irony of the situation. Less than twenty feet away, in the ground beneath a lotus tree next to my rose garden, lay a green fifty-gallon drum that I had buried in 1992. It contained the remnants of Iraq's nuclear program.

Inside was the complete set of extremely detailed plans and design drawings needed to manufacture centrifuges. More than two hundred booklets served as instruction manuals for building every piece of the centrifuge and how to assemble them. Some of the parts are so difficult to manufacture that the specifications for them are among the world's most classified information. The documents provided the specifications, tolerances, and dimensions for each part, along with the detailed designs for manufacturing them.

Also buried in the drum were prototypes of four of the most highly advanced centrifuge components. These metal pieces, small enough to fit in a suitcase, don't seem dangerous to look at, but they are incredibly complex. Manufacturing them requires elaborate calculations of geometry, advanced metallurgy, and knowledge of stress and tolerances beyond the capabilities of most nations. I spent millions of dollars,

traveled thousands of miles, and negotiated a hair-raising series of international deals in order to learn the secrets of their manufacture.

One of the four most intricate parts is the ball bearing on which the centrifuge rotor sits. Nearly small enough to conceal in your hand, the bearing is possibly its most important piece and requires mathematical precision to an infinitesimal degree. Roughly the shape of a toy spinning top, the shiny metallic ball bearing balances the centrifuge rotor tube as it spins at speeds greater than 60,000 rpm. At the bottom tip of the bearing a tiny round bead, four millimeters in diameter and etched with microscopic grooves, gives the whole centrifuge grab and play. Even the pattern of the microscopic grooves is a highly classified secret.

The second prototype I had buried was the centrifuge motor. Made of gleaming aluminum and about the size of a round loaf of bread, it contains an interdependent series of magnets and coils that drive the centrifuge. The centrifuge rotor hangs inside a hole in its center, and the magnets create an electromagnetic field so powerful that it spins the centrifuge without ever touching it. To a scientist, it is a beautiful piece of work.

The magnetic upper bearing was another marvel of science. Two segmented aluminum-nickel-cobalt magnet discs, roughly the size of checkers pieces, are connected by wispy threads of steel. Sitting at the top of the centrifuge, these magnets hold the rotor in place in a vacuum as it spins at supersonic speeds.

The fourth component—a thin, gunmetal-colored disk about six inches in diameter and two inches in height—looked deceptively ordinary to the untrained eye. Called a bellows, its purpose is to connect centrifuge tubes end to end, to create a longer centrifuge of approximately three meters in length. This longer version can enrich uranium substantially faster than ordinary two-foot-long centrifuges, thereby increasing bomb-making capacity considerably. The dimensions of a crimp—a microscopic ridge in its midsection where the centrifuge tubes meet at the point of greatest stress—required something called hairy mathematics. At the time, even the Japanese had failed to design such a bellows.

These drawings, documents, and prototypes represented the accumulated knowledge of the Iraqi nuclear centrifuge program. They were not actual weapons of mass destruction, but they were probably the most valuable building blocks for WMD that Iraq ever possessed. Saddam's son Qusay had ordered me to keep them safe from UN weapons inspectors in 1992, and the Iraqi government concocted a story that they had been destroyed by the security services. Although the weapons inspectors were extremely skeptical, this was the story we had maintained despite continual pressure. By 1998, they were Iraq's sole remaining nuclear secrets. It is difficult to overestimate their importance or the danger they potentially posed to the international community. In the wrong hands they could have enabled Saddam or anyone else to quickly initiate a deadly nuclear weapons program.

Had the American bomb exploded, the force of it might well have unearthed the plastic drum. As I calculated the distance between the missile and the lotus tree, I imagined Iraq's precious nuclear documents fluttering out of the bomb crater and carried away in the wind, or the prototype centrifuge parts being examined amid the rubble by scavengers who had no concept of their worth or their purpose. But the bomb had not exploded, and the drum lay undisturbed under the lotus tree.

Its contents had afforded me little peace for more than a decade. As the keeper of Saddam's most precious nuclear asset, I was tethered to the regime and constantly under surveillance. I assumed the Iraqi intelligence service, the Mukhabarat, was watching my every move. Even when gardening, I was always mindful of what lay just underfoot. Now that American forces controlled Iraq, I knew these buried secrets would perhaps shape my family's destiny.

When United Nations weapons inspectors entered Iraq in the fall of 2002 to search for Saddam's weapons of mass destruction, their attention quickly turned to the importance of interviewing Iraqi scientists. In November, UN inspectors demanded that some scien-

tists be allowed to leave Iraq along with their families so that they could speak freely, without risking retribution. A friend had given me a copy of a *Washington Post* article he had downloaded from the Internet that listed me as one of the top five scientists that inspectors hoped to interview outside Iraq. I read it again and again. I wondered whether my family and I might be whisked out of Iraq so that I could testify to the truth about what Saddam was and was not hiding.

This idea was soon cut short by Saddam's officials. In early February 2003, a month and a half before the war, I was called to a security meeting of the Military Industrialization Commission (MIC), in which I was the only scientist present. Deputy Prime Minister Abdul Tawab Mullah Hwaish presided over the meeting. As the head of MIC, Abdul Tawab was my boss and the man who kept me under implicit surveillance. He was a stout man who relished his powerful position and liked to shout and fire his pistol into the air during pro-Saddam rallies. With his thick brush of a mustache and in the olive green military uniform favored by all of Saddam's flatterers, it was clear how much Abdul Tawab wanted to emulate the president. Yet all he had been able to copy effectively was Saddam's ruthlessness. Abdul Tawab was well known for imprisoning military contractors who missed delivery deadlines, some of whom died in prison, and for putting scientists and engineers in confinement. He was really little more than a bully, pounding tables into splinters with his fists when he didn't get his way and shouting expletives at terrified military engineers and project leaders.

Abdul Tawab lacked the oddly graceful tyranny of his mentor. Saddam Hussein's culture of intimidation was almost mystical. Saddam made people think of him as a god, with godlike powers. Mullahs were required to praise his name before prayers, in the same breath as the name of Allah. Saddam never lost his temper, at least in public. He didn't need to. He had people like Abdul Tawab to do this for him.

Abdul Tawab called the meeting to order. After an elaborate speech about the enemies of Iraq and the duty of Iraqis and all

Arabs to resist, he excoriated the West for demanding access to the nation's weapons sites.

"There is much talk about the ultimatums of President Bush and the United Nations weapons inspectors," he said. "They are creating a pretext for war, and they want to use our honorable scientists as tools for their hostile intentions. Is there anyone here who cares to comment?"

Abdul Tawab did not look at me, and one of his deputies rose to speak.

"Some of the scientists might be eager to leave the country," the deputy said, as though making a prearranged speech. The other MIC officials shook their heads and a few clucked their tongues. "Perhaps a few of the scientists would even like to defect."

Abdul Tawab held up his hand to cut him short. He turned to me and looked me in the eye menacingly for a few heartbeats. "Let the scientists leave Iraq to meet the inspectors," he said. Then he grimaced and drew a finger across his throat. "Their families will stay here."

I trembled. Rarely were threats in Iraq so overt and so public. For decades we had endured threats that were merely implied. This is part of the Arabic way of communicating: to say something without really saying it, using subtlety to convey one's intentions. Saddam and his men were cordial but chilling, masters of deadly insinuation. With a single glance, they could freeze your blood. But Abdul Tawab's gesture was crude and unmistakable, almost stage-managed. I wondered if it had been planned beforehand.

It is difficult to describe the sense of total fear we lived under. I censored myself at work and at home because I knew my family wasn't safe. Even with the person I am closest to in the world, my wife of thirty-four years, I didn't have the courage to express my true feelings. We knew our telephone was most likely tapped, and we feared that microphones were hidden in our car or in household items such as a vase, a lamp, or the television. We trained ourselves to guard every word we said, no matter how private. My most painful regret is how my highly classified work affected my family. They lived in terror that any night I might not come home, that I

might have been imprisoned or tortured. When I came home late, it was to worried faces expressing relief.

Whenever our friends and relatives came to visit us, I noticed they were especially cautious with what they said. They were well aware that my home was almost certainly under surveillance. If a conversation touched on something even vaguely political, we instinctively used hand signals and walked out into our garden, where we felt safer from the electronic ears of the regime. This was especially true during the last weeks of Saddam's rule.

A month before the war started, we had a big family gathering in the house of one of my distant cousins. As we sat down to a sumptuous meal at a large table, the conversation turned to the American military buildup. We felt freer to express ourselves in a relative's house than we would have in my own home. Like most Iraqis, every member of my family wanted to see Saddam deposed, but we were of differing opinions about whether that would happen. Voices were raised. One group said that war was inevitable and that Saddam was finished. They were jokingly called "the hawks," after the American officials of the same opinion. At the time in Iraq, we could have been executed for saying so. Another group argued that there would be no war and Saddam would continue to rule. We called this group "the doves." Then there was a lone dissenter: a cousin of mine who predicted that the Americans would wage war on Iraq, but Saddam would survive and outlive the hostilities. I guffawed and said, "You're neither a hawk nor a dove—you're a crow!" To which everyone laughed.

Then a silence fell over the table, and terror rose in each of us. Everyone realized that we had crossed into dangerous territory. I could see my family members' eyes darting nervously around the room looking for hidden microphones. Not another word was said about the matter.

As the aircraft carriers steamed toward the Gulf and U.S. president George Bush and British prime minister Tony Blair made increasingly warlike statements to the world, the people of Baghdad began to prepare for war with resignation, but also with dignity. We

had been through this before, and we knew what we must do. Long lines for gasoline formed at every station, as drivers prepared for shortages, but this was done in an orderly fashion. The main frustrations were with costs: the jump in prices of canned foods, bottled water, and generators, as people prepared to bunker themselves in their homes. Like many families, mine reluctantly decided to buy a Kalashnikov rifle in case law and order broke down.

The world watched tens of thousands of U.S. troops setting up offensive positions near the Iraqi border in Kuwait. What they couldn't see were the strange things happening at the highest levels of Saddam's government. In the upper echelons of power, the grip of the regime tightened even further. Casual conversations turned formal, with insincere but loudly proclaimed expressions of patriotism. A delusional sense of reality spread throughout the government. Unlike the citizens of Iraq, the government seemed totally unprepared for war.

On March 19, the first day of air strikes on Baghdad, I followed instructions to report to MIC headquarters as usual. The bombing had started before dawn and then stopped, and an anticipatory lull had fallen over the city. When I arrived, fearful that I was driving into a bombing zone, a frightened-looking official told me to report instead to a kindergarten in the middle-class Jumhuriya district, which was being turned into makeshift offices for MIC directors and our senior staff. Other government agencies were evacuating to similar locations, he said. Overnight, the regime went underground, in the hope that U.S. pilots would be reluctant to bomb schools.

I reached the kindergarten in the midmorning to find a traffic jam of black Mercedes sedans and other expensive cars favored by top Iraqi officials clogging the residential alleys around the school. Classes had been suspended, and the neighborhood children were under orders to stay at home, but many had come out to look excitedly at the luxury cars suddenly filling the narrow streets. Curious residents of the three- and four-story apartments in the neighborhood peered out of their windows to watch the spectacle. I made a quick

tally around the kindergarten and counted more than fifty cars used by MIC officials. I realized that such a clot of official cars might easily be spotted by American surveillance planes, which now completely dominated the skies over Baghdad.

Inside the kindergarten Baathist officers hurried about, assigning classrooms to the various MIC departments. A chaotic meeting of directors was already underway in one of them. There had been no contingency plan for the American invasion, and it was unclear who was to be in charge. Two ranking officials, Brigadier Walid Muslih, the head of the technical department, and Raja al-Khazraji, the director general of management, shouted orders and classroom assignments as several dozen of us crowded around. I raised my hand and offered a suggestion.

"There are more than fifty of our cars parked in the immediate vicinity," I said. "This could be dangerous in view of the surveillance by American aircraft. Shouldn't we move to disperse them?"

This apparently hadn't dawned on any of my colleagues, and suddenly fear filled the room as they recognized the implications. Raja al-Khazraji barked at our drivers to scatter our cars throughout a wider area.

We were divided into emergency units, to organize short-term support for the war and weapons procurements. In one of the classrooms, I noticed a picture of Saddam Hussein posing with his late son-in-law, Hussein Kamel, who had been my boss during the years we spent developing nuclear weapons during the 1980s. We sat on miniature chairs, trying to fit our knees under tables meant for six-year-olds. Alphabet lessons could still be seen on the chalkboards. Outside our windows, swing sets and children's play equipment seemed to offer our only defense against a possible American attack. The scene might have been funny had it not been so terrifying. Next to the kindergarten, a shipping container had been half buried in the ground with a staircase leading down into the metal hull to create a makeshift bunker where we could hide in case of a bombing strike.

I sat in on one group instructed to pressure manufacturers of

rocket-propelled grenade launchers to reduce production times from months to weeks. The idea was based on the absurd assumption that armament factories could still function normally.

"What is the purpose of these RPGs?" I asked, without mentioning the well-known fact that even after manufacture, it would take weeks for the parts to be assembled into a usable weapon.

"To strengthen the army, of course!" a deputy cried.

After that first meeting, I tried to avoid staying at the makeshift headquarters for more than fifteen minutes at a time. I assigned myself "surveillance" missions to visit my science and engineering colleagues, who had been ordered to stay in other bunkers. With this trumped-up assignment, I was able to spend much of the first part of the war driving on the relatively safe streets of Baghdad, away from government buildings that were obvious bombing targets. I tried to avoid exposure and spent as much time as possible at home with my family.

The sense of total denial among government officials continued to the end, however, along with the pressure to obey ridiculous commands. On April 7, 2003, as American troops reached the very outskirts of Baghdad, I was ordered to report by 9 P.M. to the kindergarten bunker once again. My family had begged me not to go. They knew that driving across town that evening could be suicidal. The Americans were using very good intelligence to bomb official gatherings. I insisted it was more dangerous for all of us if I stayed home. The area inside Baghdad was still Saddam's Iraq and disobeying an order carried an instant death penalty.

Electricity was cut throughout the city. Buildings appeared in silhouette against the nightmarish orange glow, illuminated by fires and flashes of explosives. I drove with only my parking lights on, hoping to avoid becoming a target for the American planes. I could hear them cutting through the skies overhead.

At the kindergarten bunker, small groups of scientists, technicians, and Baath Party officials eyed each other anxiously; none of us knew why we had been called there. Somewhere above our heads a generator rattled, powering the two bare light bulbs that cast

dim shadows on the cheap conference table where our fate would be made clear. We could be jailed or executed if Saddam or his henchmen had decided we were to blame for Iraq's poor performance in the war. Or perhaps we would be ordered to embark on some grand engineering feat they had dreamed up as a last-ditch attempt to hold the coalition forces at bay. Maybe the purpose for the meeting was to keep watch on everyone, to make sure we hadn't defected.

"For what purpose?" I wondered. "Can't they read the writing on the wall?"

It reminded me of scenes from *Gone with the Wind*, in which the southerners clung to their doomed lifestyle, ignoring the advancing Union forces that were about to sweep it into history. In Iraq, the peculiar mind-set of the whole regime was symbolized by Saddam's order that key buildings be covered with mud and oil fires set around the city, in the belief that smoke would fool American pilots. The Americans could easily navigate through the smoke, but no one was brave enough to tell Saddam. In the end the smoke did more harm to Iraqi antiaircraft efforts. But because Saddam said so, everyone had convinced themselves that "if we can't see the American planes, then they can't see us," like the old folktale folly of the ostrich burying its head in the sand in order to hide.

Officials gathered in small clusters, speaking in low voices. I briefly joined one group, where a Baathist official was holding the party line, maintaining the denial. He described in detail the battle for the international airport, which he said was littered with bodies of American soldiers. The men around him nodded their heads, although I was sure they all knew this wasn't true. Another official noted proudly that Saddam himself had used the bunker we were in the previous night for a cabinet meeting. I overheard him describe the president flying into a rage at the unexplained absence of Abdul Tawab. Threatening to kill him if he had defected or tried to flee, Saddam had sent a search party to find his deputy vice president. Abdul Tawab had not fled or defected, however. He was at the head of the table preparing to lead the meeting. Despite all the speculation about the president's possible death or severe injury, Saddam was still in control.

I could see that Abdul Tawab had lost none of his theatrical menace. He slammed his fists on the table and called the meeting to order.

"I can see victory ahead as clearly as I see all of you in front of me," he said with bravado, apparently having convinced himself that this was a jolly moment, despite the thud of bombs outside and the fact that we were bunkered in an emergency meeting. "After we have slaughtered the Americans and driven them from our land, I promise to throw a big party."

He glanced over at the only woman in the room, a conservative manager named Ms. Jabriya, who had complained about entertainment at past official functions, and laughed.

"And there will be plenty of gypsies dancing, despite the objections of the lady present."

Abdul Tawab brought up the only piece of business on the eleventh-hour agenda: a request from the Iraqi army to devise a concrete beam across a highway as an obstacle to advancing American troops. A concrete beam! How telling that the men behind Iraq's military-industrial complex were reduced to the desperate level of putting up such a crude defense of the city. It was so ridiculous I almost laughed. I didn't know the exact capabilities of the U.S. military, but I had an intimate knowledge of the Iraqi forces. I had overseen the construction of facilities to produce artillery pieces, tanks, and rockets based on antiquated Russian models that were a pathetic match for the sophisticated weaponry of the Americans. I knew that the Iraqi military was like a stick of butter waiting for a warm knife. And now the army wanted us to build them a roadblock to hold the American and British forces back.

"The Americans are making whole buildings disappear with great precision," I couldn't help saying. "Do any of you really believe a concrete beam will be of any use?"

The response was silence and blank stares from those around the table. I realized with a shudder that I had mentioned the unspeakable: that the Americans would invade Baghdad very soon, and it was pointless for these men to resist. I mentally replayed my remark, hoping I hadn't sounded too pleased at my conclusion.

Under the tense circumstances, objecting to any order could be considered treason. No one challenged me, though. Perhaps they were thinking the same thing. Rather than confronting the silliness of the request, a committee was formed to design the beam.

After the meeting, we were forbidden to leave the kindergarten grounds and ordered into different security posts. I spent the night within sight of the bunker entrance, in a parked car with a Baathist partisan who kept a Kalashnikov rifle on his knees. For hours we sat listening to the bombs and artillery raining down on Baghdad, petrified that if the Americans were accurately able to track the movements of Saddam's government, our bunker would be a prime target. I worried about my wife and my grown children. Every time I heard an explosion in the distance, I pleaded silently: "Please let them be okay. Please let them survive." My worst fear was that while I sat in this car waiting for a missile intended for Saddam, my family might be in danger.

As dawn broke, I raced back home through nearly deserted streets. Above the lush palm trees and sand-colored buildings, much of the sky was black from Saddam's futile smoke screen. I saw a few Republican Guard artillery pieces and tanks hidden among the trees of public parks. My suspicion was that the smoke would not hinder the American pilots and that this Iraqi military hardware would soon be bombed. I arrived home to find my wife and children frightened but alive. We wept with relief at seeing each other, and after we embraced, I vowed not to leave them again.

My son Zaid had stayed awake all night patrolling the perimeter of our house, and he said that during the night he had heard, just beyond the wall of our garden, the voices of Fedayeen fighters setting up a position under an overpass of the Abu Ghraib Expressway, which is the major western entrance into Baghdad. He said he had heard shooting close by, minutes ago. I went to the garden wall to listen for myself. I could hear many low voices speaking in Arabic but with accents from Egypt, Syria, and elsewhere. Foreign mercenaries. I figured they had come to Iraq to fight to the end, and that they were the type who would rather die than flee.

In our living room I held an urgent meeting with my wife, Layla, my two teenage daughters, and Zaid, to discuss evacuating our home, because it seemed likely that battle was literally at our doorstep. Zaid and I decided to make a reconnaissance drive around the streets of our quarter. The alleyways around our house were deserted, and the front gates of our neighbors' compounds were all shut tight. Despite the troops gathering outside our garden wall, stillness had descended on the neighborhood. The streets seemed like a sanctuary of refuge rather than a virtual battle zone.

Zaid and I were about to return home after a final loop when we came upon an Iraqi checkpoint. A Republican Guard officer brandished his Kalashnikov rifle. He was in his twenties, with fair skin and a well-trimmed mustache, wearing the red beret favored by Saddam's elite troops. He seemed very tense. He lowered his face to our car window and looked at us with suspicion.

"Peace be upon you," he said. "Who are you, and what are you doing here?"

"Our home is here in this neighborhood," I said, pointing in the direction of our house. "Do you think it is wise to stay in the area?"

"It is your prerogative," the young officer said, "but this neighborhood is now the front line. The Americans are very close by. They are closing in, and the battle is near. I suggest you evacuate."

The officer's expression was grim, and it struck me that the inevitability of defeat might finally be dawning on Iraqi officers. A day earlier, admitting this would have been tantamount to subversion, but now this young officer's face told a different story. I realized our family needed to act quickly.

Zaid drove nearly a mile on a narrow byroad of the Abu Ghraib Expressway, searching for a place where the road widened and we could turn around. As we approached a clearing, we saw smoke rising from the highway overhead. Then, through the smoke, we spotted a smoldering American tank that had obviously been hit during a recent firefight. I couldn't see any American soldiers, but I realized we were truly on the front line and in the lull of a battle.

"Let's get back to the house," I urged Zaid, as he spun our car around.

As Zaid executed a two-point turn, I heard several sharp hissing sounds outside our car, followed by the crack of weapons fire. We were under sniper attack from American gunmen.

We both ducked our heads to the dashboard as Zaid pushed the accelerator to the floor and we sped along the byroad. We heard the hiss of bullets just missing our car. Seconds later, when we arrived home, we leapt out and bundled Layla and the girls into the back seat and made a hurried decision to drive to the home of my eldest daughter, Isra'a, who lived about fifteen minutes away in the Yarmouk area of south Baghdad.

Once at my daughter's, we felt only slightly safer. Ahmed, my son-in-law, said that the night before, American bombs had sounded dangerously close to their home too. We arranged the furniture in a ring in the living room in case the windows or the walls blew in. It made a flimsy barricade of protection for the nine of us, including my five-year-old grandson and my three-year-old granddaughter. We duct-taped all the windows with an X, leaving a few open to prevent a pressure explosion, which occurs when an explosive shock wave in a closed space blows out windows and throws people and furniture around the room. The thud of faraway artillery drew nearer, until the crack of exploding rockets became deafening. We had avoided one battlefield to find ourselves in the middle of another.

We huddled in the center of the living room as U.S. and Iraqi troops battled around the presidential palace nearby. The sharp smell of gunpowder and burning buildings stung our noses and coated the insides of our mouths. To me that will forever be the taste of war. I thought my heart would burst as I saw the terror on the faces of my family. My grandchildren wailed uncontrollably. I kept whispering to them, "Don't worry, darlings, the bombs are aimed at the soldiers and not at us. We will be just fine." But I wasn't sure at all. We all said a few silent prayers to Allah, begging to be spared.

Late in the morning, there was about a half-hour pause in the bombardment, though I could hear gunfire and tank rounds in the middle distance. I thought the worst might be over and that we had been spared. I told my grandchildren, who still wore their pajamas from the night before, to try to sleep in our laps, hoping that this might help them feel safer from the nightmare around us. Then the air seemed to literally explode. Incoming artillery rounds whistled and boomed on all sides. Fighter jets came screaming over our neighborhood dropping cluster bombs that shook the walls. I heard something that made my blood run cold: the sound of Iraqi soldiers shouting to each other in the streets south of my daughter's home. We were truly in the middle of a battle. Then we heard the sound of the engines of military vehicles and more shouting.

The thunderclap and the sound of our windows shattering came at the same moment. I may have lost consciousness for a few seconds before another rocket landed in the garden of the neighboring house, jolting us from the floor like a split-second earthquake. Moments later a third explosion rocked the air on the other side of the house. I leapt up shouting, "Zaid, Ahmed, get everyone! Let's go! Let's go!" I was sure that if we didn't move we would die sitting in the living room. The women were screaming as we picked up the grandchildren and ran for the back door. I noticed that neither grandchild was crying. They just stared at nothing with their mouths open, shell-shocked.

We scrambled into our two cars as the sky flashed around us. We were racing, but time seemed to slow down as though I was caught in a terrible dream. As we pulled onto the street leading toward the town center, we passed an Iraqi soldier on the ground. His body was cut in half, with his legs scattered near the upper part of him. His eyes were open. One arm was missing from his torso, but the other arm seemed to be reaching out to us. Even now I can't get the image out of my mind. Sometimes at night the vision of that soldier comes back to me. As he stares through our windshield, I see his lips move, forming the words, "Help me." I hope this is only a trick of memory.

My gut told me we should not go home again. I told Zaid to head for the house of my brother-in-law, Ali, across town in north-eastern Baghdad. We sped north on Damascus Street past the bombed Saddam Tower, navigating on pure adrenaline. The sky continued to pop with deafening cracks, like some new kind of lightning storm that sends out concussive waves. I was afraid we would be incinerated on the streets. Zaid wove between abandoned Iraqi cars and military vehicles. I kept glancing over my shoulder to check that my son-in-law, my daughter, and my grandchildren were still driving behind us in their Toyota. My wife and younger daughters held on to each other wordlessly in the rear seat. I reached back and held their hands.

When we reached the Al Ahrar Bridge over the Tigris River, I saw a line of cars ahead of us, and we found ourselves in a small traffic jam of other Baghdadis fleeing eastward. The Republican Guard had set up checkpoints on either side of the bridge and were forcing civilians to drive onto the sidewalk to go around them. At the bridge entrance, two young soldiers barely noticed us. They looked frightened, and I could tell they were forced to be there under threat of death from their commanders. I hoped they would be able to flee.

When we arrived my brother-in-law rushed to embrace us. "Thanks be to God!" he cried. "I was sure you had all been killed!"

As the American troops fought their way into Baghdad, we stayed at his home for several hours, long enough for a lunchtime meal. We were all tired of eating canned meat and rice and potatoes. My brother slaughtered one of his few remaining sheep, and the women set about making a traditional feast of Iraqi *pacha*: a gravy of bread, meat, and spices known as *tishrib* and white and red rice. Our small celebration was cut short, however, when the terrible sound of bombs and artillery shells began to approach Ali's home as well, and the chairs began to shake beneath us. Afraid that we would be caught in a third battle zone, I made a decision.

"We will go back to Isra'a's home," I announced, unsure if this was the right move for our safety. At this point one place in Baghdad

seemed as unsafe as any other. But in a way it felt safer to be moving. We set off on another tense journey through the wartime streets. The bombing seemed more infrequent now as we wound our way through side streets to reach my daughter's home.

Like any family anticipating a disaster, we had stocked up on supplies. Isra'a and Ahmed had a generator, and Zaid and I had recently installed a satellite dish on their roof. Throughout the night we watched live footage broadcast by BBC and Al Jazeera of the invasion happening around us. The fighting still shook the ground, even though by now it was taking place miles away. Some of the family dozed off during the early morning, but I sat riveted by scenes of the fall of our city.

After daybreak on April 9, with the sound of heavy fighting still pounding Baghdad, we saw images of American tanks on the city's southern bridges over the Tigris. That afternoon we saw something we could never have imagined. Thousands of our fellow Baghdadis mobbed the famous Firdos Square. Many used sledgehammers to chip away at the base of a statue of Saddam, cheered on by the crowd. We sat pointing at the TV with our hands over our mouths in disbelief.

"Look at that," Ahmed said. "They are chopping at his feet, and no police are stopping them!"

It was an image I knew was being watched around the world. A U.S. armored personnel carrier rolled into the square to help them, with a chain tied around Saddam's neck, to pull the statue over.

"He's going to fall!" my wife gasped.

Saddam's figure tottered, fell face forward to the ground, and was instantly set upon by Iraqis beating his likeness with sticks, their shoes, and anything else they could find. I couldn't believe my eyes. It was as though I were watching the death of the tyrant himself. There fell the man who, for more than twenty years, had kept me and my fellow scientists physically and mentally on a string around his finger and my family under a shadow of fear. There fell the man for whom, years earlier, I had tried to produce enough enriched uranium for a nuclear weapon. There went the statue of a

man who used fear to make scientists lie and deceive. He was pulled down by his neck.

A tyrant bends every aspect of his subjects' behavior to his rule. My family and I had survived the worst of it, thanks to my position. We had lived on shaky ground, second-guessing our most intimate whispers, since before most of my children were even born. Saddam had literally ruled our lives. In that instant the fear that my family and I had lived through did not disappear, and in some respects it probably never will, but its grip loosened ever so slightly. The fall of that one statue seemed to set free an emotion that I don't have a name for. Although the war was still raging and uncertain, we cheered openly and embraced each other. We looked at one another in disbelief, shaking our heads and grinning with the first sense that a long nightmare might be about to end.

The following day, as I stared in bewilderment at the American bomb in our garden, my elation evaporated. My mind turned to the nuclear secrets buried a few feet from where I stood. They would be of major importance to everyone with an interest in what had been Iraq's programs to develop weapons of mass destruction. I could see many dangers still ahead and potential consequences, none of which were yet fully formed in my mind. It was as though the documents and components were ticking underneath the soil like a time bomb. Only one thing was clear: what I did with Iraq's remaining centrifuge secrets would most likely determine the fate of me and my family forever.

The first item on my agenda, however, was to remove the unexploded American bomb from our garden, so my family could return home. For more than a week after I discovered it, I made repeated attempts to find American soldiers to take it away. At first, I felt nervous about the idea of speaking to them. I walked out to the main road near our home, which is next to the highway that leads westward through the desert to Jordan. An American M1 Abrams tank stood guard on the overpass, which days earlier had

seen heavy fighting with the Fedayeen Saddam and the Republican Guard. They were the first American soldiers I had seen. They looked quite young, and somewhat at a loss as to how to respond to the crowd of Iraqis gathered around their tank shouting things such as, "Hello, mister! Saddam bad. Thank you!"

I approached the tank and waited among the crowd until one of the soldiers noticed me. Then I called up to him, trying to sound jovial and relaxed.

"I hope you're enjoying our fine Iraqi weather," I said. "Is it a perhaps a bit hot for you?"

He looked startled at the sight of an Iraqi man speaking in fluent English.

"Where do you come from?" I asked.

"Arkansas, sir," he said. His lower lip bulged with a wad of chewing tobacco, so his words came out slightly garbled. He spat into the lower half of a plastic water bottle.

"I have visited your lovely state," I said. "It was many years ago on a camping trip, when I was a student at the Colorado School of Mines. Have you heard of it?"

"No, sir."

"Well, you are very welcome in Iraq," I said. "I was hoping to ask a favor. There is one of your unexploded missiles in my backyard. Do you think it would be possible to find someone to remove it?"

The soldier gave me a blank look.

"I have orders not to leave my position, sir," he said.

He directed me to a U.S. Army camp being erected in a field about a mile from my home. Zaid parked nearby and I stood at the gate hoping that by wearing slacks pressed with my wife's battery-operated iron and a freshly laundered sport shirt, I appeared different from the rest of the crowd. When I saw a young man with two stripes on his uniform, I spoke up.

"Excuse me, sir, I was hoping to report a missile in my backyard," I said. "To whom should I speak?"

"Come back later," he said. "We're just getting set up here."

I returned the next day and was told at the gate to speak to

a Lieutenant Copley. I waited three hours, and when Copley arrived, obviously preoccupied, he asked me to meet him the following day.

"At what time should I come?" I asked.

"About three," he said.

I arrived at three the following day and approached a young sergeant who manned the gate.

"You're not supposed to stand here!" he shouted.

"But I have a meeting with Lieutenant Copley," I said. "It's about an unexploded missile, you see."

"Out!" he shouted, motioning for me to remove myself. I was surprised at his brusqueness. Just then the gate opened and a convoy of military vehicles entered the camp from the street, sending a thick cloud of dust over me and Zaid.

"Stand back!" the sergeant shouted, too late to save my freshly laundered clothes from a coat of Iraqi dust.

A few days later I stopped to speak to an army unit parked by a roadside in our neighborhood. I was pleased when the soldiers told me they were engineers. Their commanding officer, Captain Butler, was a handsome young African American man with a friendly manner.

"As engineers, what sort of work are you doing here in Iraq?" I asked.

"Right now, we're mostly detonating unexploded ordnance," he said. "But we'll be doing reconstruction projects as soon as this mission is accomplished. Our mandate is to try to make Iraq a better place."

I liked Captain Butler from the moment I met him. He showed me a misshapen cylinder of metal and explained that it was part of an American cluster bomb that his unit had found in the neighborhood. They had made a controlled explosion to render it useless. When I told him about the unexploded bomb in my garden, hundreds of times the size of his cluster bomb, he seemed genuinely alarmed and promised to come to my home within a couple of hours.

Captain Butler came that afternoon as promised, with five soldiers from his engineers unit. I led them into my garden, and when he saw the dimensions of the thing, he let out a whistle and said he would have to come back the next day with a bigger truck. He returned the next morning with twenty soldiers and a large flatbed vehicle. I took them around to the side of my house and showed them the missile, and they looked at each other nervously and ordered me to stand back as they cut my metal gardening rack apart and gingerly removed it. As most of the soldiers stood back, shouting at their commander to be careful, Captain Butler and two of his men hoisted it on their shoulders and carried it to an armored vehicle to be carted away for controlled detonation. I had reason to believe that if the missile had not exploded on impact, it was unlikely to detonate now on the shoulders of these young American soldiers. After they strapped the missile on their truck, I led Captain Butler back to my yard.

I am proud of my garden, and I showed Captain Butler my prized gardenias and fruit trees, which he was kind enough to admire. A few feet away, the branches of the lotus tree shaded the spot where Iraq's nuclear know-how still lay buried. During my years pruning roses and gardening with the plastic drum just underfoot, I had been struck by another irony of the situation that I had not been aware of when I chose this place. In the Koran the lotus, or *lote*, represents the boundary between mortal knowledge and God, the border between what is known and what cannot be known. It symbolizes the furthest edge of human pursuit, beyond which there is only divine judgment. I had a fleeting urge to tell Captain Butler about this story. He seemed like a nimble-minded young man who would appreciate the subtle layers of meaning behind it. But the secret was too dangerous to reveal in this setting. Instead, I led Captain Butler away from the lotus tree to the edge of my lawn, where the gray, cone-shaped object had come to rest on the dichondra grass.

"I believe this might be the fuse of the bomb," I said, picking it up. I showed him the chipped edges and suggested that this piece

had been at the nose of the missile but had dislodged on impact and been hurled to its current position.

"The fuses of your missiles are normally at the front end, isn't that correct?" I asked. "Perhaps this is why the bomb failed to explode."

Captain Butler agreed that this was a likely explanation, but he gave me a strange look.

"How do you know all this?" he asked incredulously.

I shrugged, knowing that to say more could invite awkward questions.

"I'm an engineer," I said, without elaborating. "Just like you."