THE CORDELIA SERIES · NO. 02

The *Heat* in the Bone

How the Gulf came to live at the edge of human heat — and what one ordinary afternoon reveals about who the cool protects, and who it leaves outside.

YAHYA M. AL-FARSI

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AN ELEMENTS BOOK

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The Heat in the Bone

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TRUTH · JUDGEMENT · IMPACT

For those whose work is done in the heat, so that the rest of us may live in the cool.

Climate inhabits us long before we learn to measure it.

— Yahya M. Al-Farsi

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PROLOGUE

An Ordinary Afternoon

The door opens and the heat arrives at once. Not gradually, not as warmth, but as impact.

Stepping out of the supermarket in Muscat, it feels almost physical, as if the air itself had weight. The skin tightens. The eyes narrow. The breath turns shallow. It is late July, just after three in the afternoon, and the sun is still high enough to make the parked cars shine white at their edges.

Inside, it had been twenty-one degrees — cold enough, almost, to forget the season. The chilled air had held the smell of coffee, cut fruit, and polished floors. A child sat in a trolley eating ice cream that did not melt. An old man in a white dishdasha leaned over a display of dates, unhurried. In such places the body stops negotiating with weather, and it becomes easy to believe the day outside has been suspended.

But the door reminds you otherwise. The heat waits.

A few metres from the entrance, the asphalt radiates upward so fiercely it seems to meet the sun halfway. Beyond the low buildings, the sea breathes its humidity inland — this is the Gulf's particular summer, not only hot but wet enough to make sweat feel futile. Moisture

gathers on the skin and lingers there, shining instead of vanishing.

A man carries bags to his car, shortening the crossing without thinking. No one lingers in the open unless they have to.

Except some do. At the edge of the lot, a delivery rider waits in the thin shade of a wall — not enough to cool him, only enough to interrupt the sun. His shirt is dark at the chest. He checks his phone, then looks up each time the doors slide open. He belongs to the heat in a way the shoppers do not; his work begins where theirs ends. Nearby, a man in blue overalls crouches beside an air-conditioning unit, repairing the machine that keeps the inside cold, while behind the building, out of sight, the compressors throw their heat into a narrow service lane.

The cool interior is not separate from this scene. It depends on it.

The car door opens onto another pocket of cold air. At the traffic light, the city unfolds in layers of temperature: glass towers reflecting sun, workers in fluorescent vests beside unfinished roads, schoolchildren moving from one cooled building to another, a bus stop where men wait under a thin metal roof that holds shade but not relief.

Nothing here is unusual. That is the point.

There is no emergency, no collapse, no ambulance. The city is functioning exactly as it was designed to. Roads are being laid, food delivered, children sleeping in cooled bedrooms. Heat is being moved continuously from one place to another — and because it is ordinary, it becomes difficult to see.

But everything the rest of this book will say is already present in this one afternoon. The cool room and the hot street. The machine and the body. The worker and the shopper. The house and the tower. The day and the night.

A city divided not by walls, but by temperature.

And all of it separated by a single door.

CHAPTER ONE

The Survivable Limit

The human body is warm by design. At rest, deep inside, it holds itself close to thirty-seven degrees Celsius with remarkable discipline — not thirty-six, not thirty-eight, but within a narrow range that biology guards carefully. Enzymes work there. The heart beats there. Thought itself depends on that constancy. A few degrees in either direction, and life begins to destabilise.

This stability is not isolation from the world but constant negotiation with it. Every movement of muscle, every beat of the heart, produces heat; even at rest, the body is a small furnace. When the surrounding air is cooler than the skin, that heat leaves on its own, by radiation and convection. A breeze helps. Shade helps. Night helps. But as the air warms toward skin temperature, the gradient narrows and heat stops leaving easily. That is when sweat begins to matter.

Sweat is the body's emergency cooling system. Fluid released onto the skin carries heat away as it evaporates — liquid becoming air, taking the thermal burden with it. It is one of the reasons human beings can work and build under a sun that would drive most mammals into shade. But sweating has a condition: it works only if the

environment can receive what the body is trying to release.

This is the fragility built into the system. In dry air, sweat evaporates quickly and the skin cools. In humid air, where moisture already saturates the atmosphere, evaporation slows; sweat remains on the skin instead of leaving it. The body spends its water and stays hot — one of the cruellest bargains in physiology: to lose fluid and gain no relief.

The Gulf knows this bargain intimately. Its summer is shaped by the sea. The shallow Arabian Gulf and the Gulf of Oman warm easily and feed moisture into the air, so that the body's most important cooling system falters precisely when it is needed most. The body compensates — the heart beats faster, vessels widen, the kidneys conserve water — and often it succeeds. Most hot days do not end in collapse. But success has a cost, paid in water, salt, and strain, and it rests on one assumption: that enough cooling remains possible.

That assumption has a limit.

For decades, scientists have tried to define it — not the point at which heat feels unbearable, but the point at which the body, even resting in shade with unlimited water, can no longer keep itself alive without external cooling. Sensation is a poor guide here: a person can feel miserable and remain safe, or feel only strained and already be in danger. What defines the limit is not feeling but physiology.

The measure is not ordinary temperature but wet-bulb temperature — the temperature reached when water evaporates into the air. Because evaporation is exactly

how the body cools, wet-bulb is not a measure of heat alone but of whether heat can still leave the body. A dry forty-five degrees and a humid thirty-five are not equal burdens: the first may still allow sweat to evaporate; the second may not.

For many years, the classical upper limit of human survivability was placed at thirty-five degrees wet-bulb — the point at which even a healthy person, resting in shade with unlimited water, can no longer shed the heat the body keeps making. It entered climate science almost as a boundary of the imaginable, belonging to distant models. But the science has shifted. Recent laboratory work suggests the true functional ceiling may begin closer to thirty-one degrees wet-bulb, even in young, healthy adults — and lower still for the old, the ill, the overweight, and those working rather than resting. The line is not a cliff but a narrowing ledge, and the closer one comes, the less margin remains. A labourer lifting under the sun is not a rested subject in a laboratory; real life is always messier, and always closer to the edge.

For most of history this ceiling stayed theoretical, because few inhabited places reached it. But the hotter century is changing that — and nowhere sooner than along the warm coastal edges of the Gulf, where sea, air, and heat combine into one of the most physiologically demanding climates on Earth. Brief episodes of extreme wet-bulb heat, once thought to belong to future projections, have already been recorded here: in the summer of 2015, Bandar Mahshahr, on the Gulf's northern shore, briefly registered a wet-bulb reading close to the old thirty-five-degree ceiling. Not every day,

not every city, not continuously. But enough to change the conversation. Once a place begins touching the outer edge of human tolerance, even briefly, it enters a different category of climate — and this makes the Gulf one of the first regions on Earth where the old theoretical ceiling of survivability has begun to matter outside the laboratory.

And it matters unevenly. Heat is one of the quieter disasters. Floods destroy visibly and storms tear roofs away, but heat leaves the buildings intact — roads remain, lights stay on, shops open. The damage moves inward instead, into kidneys, sleep, mood, and cardiovascular strain. Because so much of the Gulf's exposed labour is migrant, that burden may not even remain where it was incurred: the kidney that fails years later may fail in another country, never entering the region's statistics. The heat becomes real without becoming visible.

This is why the Gulf matters beyond itself. Cities across India, Pakistan, and coastal Africa are moving toward the same combination of heat, humidity, density, and unequal cooling. What is happening here may be less an exception than a preview — a map of future survivability drawn in advance. But to arrive at the edge first is also to have the first chance to respond. The Gulf has what many hotter regions lack: capital, engineering, public-health systems, and a long memory of building under thermal constraint. The question is no longer only how hot a place can become, but how a city must change once it knows the body is nearing its limit — and whether the cool it manufactures can be shared, or whether some

bodies will always be asked to absorb more of the climate than others.

That question is where this book begins.

CHAPTER TWO

The Two Temperatures

At noon, the city says it is forty-two degrees. The number appears everywhere — on the weather app, on roadside signs, in the small talk of summer — and it carries authority because it feels exact. But the city is never one temperature.

The official figure is honestly made. It is measured in shade, at a fixed height, shielded from direct sun, so that climates can be compared and tracked. It is good science. But no one lives inside the weather station. A person walks on asphalt, waits beside concrete, touches metal railings, sits in traffic where engines add their own heat. The body does not experience air alone; it experiences the total environment — radiation, surfaces, humidity, wind, movement — and it sums all of it continuously. Meteorology isolates variables; physiology combines them.

So the same forty-two degrees can be two different events. Dark roads absorb solar radiation through the day and release it upward: a thermometer in shade may read forty-two, and the road itself may be twenty degrees hotter. A worker kneeling on it, or a rider paused above it, lives inside both temperatures at once. This is radiant

burden — the heat the body gains from sun and surface, which the official number never captures.

Weather reports try to close the gap with "feels-like" temperatures, but even these remain crude — they reach for humidity and sometimes wind, yet miss whether one is moving or waiting, lifting or resting, ringed by reflective glass or sheltered by stone. A delivery rider stopped at a light may sit inside five sources of heat at once: sun overhead, engine below, asphalt beneath, exhaust beside him, humidity around him. And duration matters as much as degree. A pedestrian crossing quickly shortens exposure; a worker waiting for materials, a cleaner waiting for transport, a man at a bus stop at four o'clock cannot. Ten minutes may be manageable; three hours may not. The same temperature becomes a different biological event depending on how long the body is asked to hold it.

The body's heat is therefore always more local than the city's — and more unequal. A man inside a cooled office may meet that forty-two only in the seconds between car and door. A municipal cleaner sweeping pavement carries it for hours, the sun landing on his neck and forearms, the asphalt reflecting into his legs. These are not variations of one day. They are different climates lived within a single city, and occupation decides which one a body inhabits.

So does everything the thermometer cannot see. A child's body cools differently from an adult's. The elderly regulate heat less efficiently. Chronic disease narrows tolerance. Pregnancy changes thermal burden. Medication can alter sweating, circulation, thirst. The

official temperature knows none of this. But the body does. No heat map is complete unless it includes biology.

The body is exquisitely sensitive to gradients. A narrow alley in old Muttrah can feel radically cooler than an open boulevard — not because the air has changed much, but because the body no longer carries the direct solar load. One patch of shade matters; one moving current of air matters. This is what modern urban design, imagining heat in averages, tends to forget: the body lives in particulars. Out of those particulars comes something one might call a thermal biography. One body accumulates years of cooling; another accumulates years of heat. By middle age the difference shows — in kidneys, blood pressure, sleep, endurance. The city records employment, housing, illness, mortality, but beneath these lies a quieter record: who stood where, who waited longer, who slept hotter, who recovered fully, and who did not.

Nothing draws this line more sharply than a sheet of glass. Stand outside a tower in Muscat at two in the afternoon: the pavement pushes heat through the soles of shoes, the air trembles above the cars, a cleaner pauses in the thin shade of the façade. Inside the same glass, the air is twenty-one degrees and dry, and meetings proceed as though weather were happening elsewhere. Older inequalities were spatial but shared an atmosphere — the rich sweated less, but they still sweated. The machine changed that. For the first time a city could hold radically different climates within a metre of each other. A banker and the worker washing the tower's glass may be separated by less than a metre

of material and twenty degrees of lived temperature: one preserving concentration, the other preserving core temperature.

And this difference does not stay outside the body. A cooled body ages differently from an exposed one; the kidney knows it, the heart knows it, sleep knows it. A city may feel temperate from inside even as the bodies sustaining it accumulate heat outside — and physiology, kept long enough, becomes mortality. The most careful study we have of this bargain followed Nepali construction workers in Qatar: among men mostly in their twenties and thirties, cardiovascular deaths climbed from roughly a fifth of all deaths in the cool season to well over half in the hot one, tracking the afternoon heat almost month for month. Many, recorded blandly as cardiac arrest, had in truth been explained as nothing at all. It is the two-temperature city read at its final page: the cool side keeps its comfort, and the hot side keeps the count.

CHAPTER THREE

The Ledger of Thirst

He was thirty-one, from a village in southern Bangladesh, and had been in Oman for six years — long enough to know the roads of Al Batinah better than the roads at home, and to read the moods of summer by smell alone. By July the air thickened, carrying the metallic scent of heated dust, diesel, and sea-salt off the coast, until the whole country seemed to narrow into one sensation: heat pressing from every direction at once.

It was just after two in the afternoon, outside Barka, on the shoulder of a half-finished road where the asphalt still held the morning's pour. He stood with a rake, spreading gravel over the fresh black line while the tar machine moved behind him like a slow, heavy animal breathing heat of its own. He had already drunk two bottles of water since noon; they were warm now, and the last mouthful gave him nothing — not relief, not coolness — before the thirst returned, sharper than before. Salt had dried in pale lines under his arms. On the highway beside him, families passed inside sealed cabins held at twenty-two degrees, as if the weather were happening elsewhere. Here, on the shoulder, the temperature was not a number but a weight, and the sea a few kilometres away gave the air the humidity that mattered most: sweat

formed easily but left the body slowly. The skin shone, but it did not cool.

By four his head had begun to ache — a low pressure behind the eyes — and when he urinated into the gravel the colour was dark amber, almost brown. This, too, was familiar. The body is an obedient thing; it adjusts to hardship, and because it adjusts, hardship begins to feel ordinary. A man who works through Gulf summers learns to ignore the dry mouth, the dizziness on standing, the tiredness sleep does not repair. By the time the body speaks in a voice too loud to ignore, much of the work has already been done.

Years later, after he returned home for good, the tiredness remained. Then the swelling began — ankles first, then the face. Blood tests found creatinine far higher than expected in a man his age, and kidneys already scarred. Diabetes? No. High blood pressure? No. Family history? None. There was no clear explanation. His is a representative story — a composite drawn from a documented pattern rather than a single case file — and it is no longer rare. It has appeared in farming villages across Central America, in men whose kidneys failed outside the usual textbook logic, and it has forced a hard question into medicine: whether heat itself, repeated often enough and endured long enough, can write its damage directly into the organs — not through collapse or heatstroke, but slowly, through afternoons like this one.

For most of modern medicine the kidney followed a familiar script. Diabetes damaged its vessels; high blood pressure narrowed its filters; age wore it down. Then, in

certain parts of the world, patients began to appear who did not fit — young, mostly men, strong enough for long days in fields and on construction sites, with none of the usual diseases, yet with kidneys failing all the same. They did not appear evenly. They clustered around one kind of labour: hot, physical, repetitive, often outdoors. The pattern was occupational before it was medical — and in epidemiology, clustering changes the question. Something in the environment was entering these bodies often enough to leave a mark.

Medicine has a name for it now: chronic kidney disease of non-traditional causes, or CKDnt. The name is less a diagnosis than an admission that the traditional explanations are insufficient. What it marks is an injury that lies not in the exception — the collapse, the ambulance — but in the routine: the afternoon worked through, the litre not replaced, the dark urine accepted as normal. The body is betrayed not by disaster but by repetition.

The clearest outline of the disease emerged far from the Gulf, among men cutting sugarcane in Nicaragua and El Salvador. At first suspicion fell on pesticides or heavy metals — sensible guesses, since agricultural labour carries many exposures. But as the pattern widened, the geography of the disease followed heat as much as it followed farming: the burden was heaviest in the hottest, lowest-altitude zones, even where crops and practices were otherwise similar. Researchers looking closer found something unsettling. Kidney function in some workers worsened over a single harvest, not over decades. Biomarkers of acute kidney injury rose across

work shifts and, in some men, never fully returned to baseline. A kidney does not always heal cleanly, and acute injury, repeated often enough, can become chronic. When interventions added the simplest things — scheduled water, rest, and real shade — core temperatures rose less and the markers of kidney stress improved. If changing the heat burden changed the kidney burden, heat was no longer background. It was part of the mechanism.

The explanation begins deeper, in the chemistry of thirst. Heat drives sweat; sweat drives dehydration; blood thickens, and the kidney, always sensitive to flow, receives less. It shifts into conservation, and the hormone vasopressin — the body's signal of thirst made chemical — tells it to hold on to what remains. In short bursts this is protective. But under repeated heat stress, when recovery is never complete, vasopressin lingers, and conservation becomes injury. Under this strain the kidney begins producing fructose from its own chemistry — an organ manufacturing sugar as an emergency fuel. The problem is what follows: fructose metabolism inside the kidney generates uric acid, oxidative stress, and inflammation. A defence built for occasional hardship is triggered too often, and the very mechanism that helps the kidney survive dehydration may be one way it slowly scars itself. No single afternoon explains the disease. Enough afternoons together may.

The Gulf was not where this disease was first named, but it may be one of the places where its conditions are most fully assembled. The Gulf has no multi-year cohort on the scale of the Central American work — no study

that has followed outdoor workers across a whole career. But the evidence is no longer absent: a longitudinal study of construction workers in Saudi Arabia has already documented heat-related kidney injury across the working day. And exposure, here, is everywhere. The modern Gulf city is built and maintained by a workforce that largely stands outside it — on roads, towers, ports, and farms — in a summer that is not merely hot but maritime: heavy, humid, coastal. At forty-five degrees in dry desert air sweat can still evaporate; at thirty-eight in saturated coastal humidity the body may struggle more. For the outdoor worker this changes the arithmetic of survival.

The Gulf's version of the disease may also be harder to count, because its labour is transient. A man may spend ten years under Gulf heat and fall ill only after returning to Bangladesh, Nepal, or Pakistan — the injury surfacing where the climate that shaped it no longer reaches. The burden migrates. The host country never fully inherits the chronic disease; the home country never fully knows where it began. And death certification is blunt. Cardiac arrest. Natural causes. Renal failure. These are endpoints, not explanations. They record how the body stopped, not what wore it down — and when heat contributes through dehydration, arrhythmia, or kidney injury, it disappears inside broader labels. A city can appear healthier than it is when part of its disease leaves before it is counted.

What unsettles most is how humble the prevention is. By the time the kidney fails, medicine becomes sophisticated quickly — biopsies, dialysis, whole systems

rising around the damaged organ. Yet much of it may begin with something as ordinary as not enough water in the middle of the day. The interventions that work are not dazzling: reliable water, protected rest, real shade — treated not as advice to the individual but as infrastructure built into the work itself. This is one of public health's oldest lessons: the healthier choice must be made the easier choice. To tell a labourer to "drink more water" while the pace of the crew and the pressure of wages push against every pause is to misunderstand the environment entirely.

This is why the kidney belongs at the centre of the book. It does not burn like the skin or pound like the heart; it suffers quietly, and its injury is almost never theatrical. The skin cools by evening and forgets. The kidney does not. It keeps the account faithfully, storing each unfinished debt of thirst until, years later, the ledger is opened. And once one learns to read that ledger, the rest of the landscape looks different — the road, the tower, the cooled room, the machine humming behind the wall are not outside this physiology but part of it. To follow that system outward, from the organ back into the city, is to arrive at the machine that makes modern Gulf life possible, and deepens the very heat it protects us from.

CHAPTER FOUR

The Machine That Makes the Heat

At midnight, the city was still hot — not the dry heat of afternoon but its residue, the heavier warmth the walls release after the sun has gone. Concrete exhales. The sea returns its stored heat to the air as moisture. Even after dark, the body steps outside and feels that the day is not finished.

Inside the villa, it was twenty-one degrees. A child slept under a blanket, the windows shut, a small green light glowing on the wall unit while the machine pushed cold air into the room with a soft, continuous breath. Every few minutes the compressor outside woke, strained, and settled again. No one inside thought about it. That is part of what air conditioning does best: it does not simply cool a room, it erases weather as a daily concern. A century ago the Gulf's relationship with heat was intimate — it shaped work, architecture, sleep, even speech. Today much of that negotiation has been outsourced to a machine, and the machine is astonishing. It can hold a room at twenty-one while the city outside holds thirty-eight at midnight; it cools hospitals, preserves medicines, protects the old. Much of

contemporary Gulf life would be difficult to imagine without it.

But the machine performs a stranger act than most people realise. It does not destroy heat. It *moves* it. Inside the sleeping room, heat is pulled from the air, absorbed into refrigerant, compressed, and expelled outside. The coolness within is purchased by warming somewhere else. At the scale of one room this is nothing. Multiply it by a city — thousands of compressors humming through the dark, blocks and hotels and malls that never fully stop — and it becomes atmospheric. Stand in a narrow service lane behind a row of buildings and feel it: the hot breath of condensers warming the very air from which relief is sought. This is part of what climatologists call the urban heat island, and air conditioning contributes to it in a peculiarly intimate way. It takes heat from rooms where people are sleeping and returns it to the streets where other bodies may still be working.

And the machine is hungry. In much of the Gulf it is not one appliance among many but the dominant consumer of electricity. In countries such as Saudi Arabia and Kuwait, cooling can account for the majority of peak electricity demand during the hottest months; the International Energy Agency puts the Middle East figure as high as seventy per cent of peak demand on the hottest days. This matters because a city does not build its power stations for mild winter days — it builds them for the hottest afternoon in July. At two o'clock, when the outdoor worker is under greatest strain, the indoor city makes its greatest electrical demand: homes, offices, malls, hospitals all leaning harder into the machine at

once. The hotter the exterior, the more fiercely the interior resists it. Climate and electricity lock together.

This dependence is both liberating and binding. Air conditioning freed Gulf societies from ancient thermal limits — it extended the day, made sleep reliable, allowed dense cities to rise. But every liberation creates a new dependency. The cooled city cannot easily return to the body's older negotiations with heat, because it has reorganised itself around perpetual mechanical relief. Windows no longer open. Twenty-one degrees becomes normal; thirty-five becomes intolerable, not only physiologically but culturally. The machine's appetite grows not only because the weather is hot, but because expectation has cooled.

The larger cost is slower, and lies partly in chemistry. Air conditioners still run, in much of the region, on power drawn from natural gas and oil, so every hour of cooling carries an upstream heat shadow — fuel burned, carbon released. The hotter the world becomes, the more cooling is used; the more cooling is used, the more warming is reinforced. It is not a perfectly closed loop, but it is real enough. And there is a further layer: the refrigerants themselves. Molecule for molecule, some are some thousands of times more powerful than carbon dioxide when they leak, and units age, seals fail, and the chemistry escapes silently while the atmosphere keeps the account. Global agreements such as the Kigali Amendment exist precisely because cooling had itself become part of the warming problem.

None of this makes the machine a villain. In the Gulf, air conditioning is not luxury in the ordinary sense — it

protects infants, the elderly, the sick; it keeps hospitals functioning and reduces heat deaths. The point is not condemnation but dependency: a society can become so reliant on a technology that it loses the ability to imagine the environment without it. And globally the trajectory is steep. Cooling consumes roughly a tenth of the world's electricity today, and demand may triple by mid-century as more of the world becomes hotter, wealthier, and more urban. In that future the Gulf is less an exception than an early model — a remedy that deepens the condition it treats, requiring ever more of itself in response. Which raises a quieter question: were there older forms of intelligence, older ways of living with heat, that might still have something to teach before the machine took over entirely? In the Gulf, that memory once lived in the shape of the house itself.

CHAPTER FIVE

The Tower and the Wind

Before the machine, the day had a shape. Not the flattened continuity of modern indoor life, where noon and midnight feel thermally identical, but a day arranged around heat as one arranges life around a tide. In Oman, before air conditioning became ordinary, summer was not something escaped but something read, anticipated, and accommodated. The body, the house, and the hour belonged to one another.

In Muttrah in the 1950s, the afternoon had its own silence. The walls of the old houses — coral, lime, mud — held the day inside them like stored breath, and in the narrow lanes one wall shaded another. At the centre of the house a courtyard opened, its light broken by beams overhead; children lay on palm mats, and a clay jar sweated by the wall, cooling its water by evaporation until it was not cold — not in the way we now mean cold — but cooler than the air, enough to feel like mercy. Windows were placed for the movement of air as much as for light. A grandmother might stand and watch not the sky but the curtain, for the slightest tremor of breeze. The house was a conversation with air, and the body was part of it.

This was thermodynamics made social. Work shifted to the cooler hours; the hottest part of the day was often for stillness, and rest was not indulgence but adaptation. By evening the stone began to release what it had stored, and families moved upward — to rooftops and terraces, where bedding was carried out and children slept under the open sky, close to whatever breeze existed. That nightly reprieve was not comfort in the modern sense but recovery: the house emptied itself of heat, and so did the body, and morning began again with reserves restored. To remember this is not to idealise it — life was harder, disease harsher — but the relationship between body and heat was more direct, and in that honesty architecture became a form of knowledge.

To build in heat is first to understand what the sun does. It does not merely warm; it loads surfaces — stone, plaster, sand absorb radiation, store it, and release it later. Older builders learned this through repetition, and the old streets of Muttrah, Sur, and Nizwa narrowed the way they did as a thermal intelligence: one wall shading another, the lane itself becoming a ribbon of protected air. Shade was not private but shared. Walls were thick because mass slows heat — a thick coral-stone wall does not stop the afternoon sun, it delays it, so that the warmth arrives inside only as the outside air begins to cool. The house was always buying time, and in hot climates time is a form of cooling. The courtyard added inward shade and let hot air rise and escape, and life migrated across it through the day, following shade the way a compass follows north.

The most elegant expression of this intelligence was the wind tower. The Gulf called it the *barjeel*; Iran the *badgir*, Egypt the *malqaf*, Pakistan the *mungh* — one device, and a shared inheritance across the whole hot belt of the region. Rising above the rooftops like an open mouth, it caught moving air at higher elevations and directed it down into the rooms below, sometimes guiding it over water or shaded shafts to cool it further. No electricity, no compressor, no refrigerant — only geometry cooperating with atmosphere, because the architecture respected airflow rather than sealing against it. The carved screens, the deep-set openings, the shaded arcades were not ornament alone; their beauty was often secondary to their intelligence. None of this made the Gulf cool. That was never the aim. It made the Gulf livable — and that distinction, between erasing heat and negotiating with it, may be one of the most important the modern world has forgotten.

The old builders shaped bodies as much as houses. The modern Gulf body crosses heat rather than inhabits it — car to building, shop to car — its exposure brief and interrupted. The older body carried heat long enough to negotiate with it, and in doing so developed what physiology now describes only in laboratories. This is what modern physiology calls acclimatization: with repeated exposure, sweat begins sooner and becomes more efficient — less salty, more even — circulation improves, and core temperature rises less under the same workload. The fisherman rising before dawn and the porter carrying goods through shaded alleys were not extraordinary bodies but ordinary ones trained by

repetition. And the adaptation was cultural as well as biological: people learned when not to move, stored water in clay because clay cools by evaporation, ate lightly by day and sat low near cool floors. Heat is cumulative, and survival in it is built from small increments — a little less sun, a little more airflow, a little more water retained — woven so deeply into ordinary life that they were never noticed as adaptations at all.

To remember this intelligence is necessary; to idealise it would be a mistake, because the old house had real limits. A barjeel can move air but cannot make it colder than the atmosphere it draws from; thick walls delay heat but do not abolish it. A room cooled by wind and mass might be five or six degrees cooler than the street — enough to mean the difference between strain and relief, but not the difference between thirty-eight and twenty-one. For a hospital, a neonatal ward, an operating theatre, that discontinuity is not a luxury but a requirement, and it is one honest reason the machine won: not because old architecture failed, but because modern systems asked for conditions it could not reliably provide. There were limits of scale, too — a wind tower works on a house, not a forty-storey office — and of expectation: the old world accepted a wider band of discomfort because it had no alternative. It was not thermally gentle. It was simply coherent.

There is also the matter of climate itself. Traditional architecture evolved under a cooler baseline, when nights still cooled reliably and the bargain between thick walls and evening release could hold. As nights warm, that reprieve weakens; a wall has less chance to empty

itself by dawn, and the house begins each day already carrying part of yesterday. This is why nostalgia is dangerous — the climate those forms evolved within is moving away from us. What survives, then, is not the form but the principle: shade still matters, orientation still matters, ventilation and thermal mass still matter, and the body still benefits from gradients rather than extremes. The lesson of the old house is not that we should rebuild the past, but that heat is first an architectural problem before it becomes a mechanical one. The tragedy of many modern Gulf cities is not that they embraced the machine, but that they often stopped asking the house to do any work at all — and that surrender, more than the machine itself, may be the real rupture.

CHAPTER SIX

The Night That No Longer Cools

At 2:30 in the morning, the power cuts. It lasts less than three minutes. In a modern apartment in Muscat that should be nothing — the lights go out, the unit falls silent, the low electrical hum disappears. Then the heat begins to return. Not like opening an oven, but like a presence reclaiming the room: the walls give back what they stored in the day, the mattress warms, sweat gathers at the neck. The sleeper wakes before understanding why.

This is one of the body's oldest reflexes. Sleep depends on surrender, and surrender is difficult when the body still believes it is under threat. This is why night has always mattered so much in hot climates: the day may be harsh, but the body can endure harshness if relief is coming. The house empties itself of warmth, the skin cools, the pulse slows, and by morning much of what was spent is restored. That nightly reprieve is older than civilisation — heat rose by day and fell by night, and the drop gave the body a thermal valley in which to repair. The Gulf once depended on it deeply, its rooftops filling with sleepers waiting for the sea breeze.

But the modern Gulf is changing the night. One of the quieter signatures of climate change is that the nights themselves are growing hotter — the cool minimum the body depends on climbing year by year. The daytime maximum makes headlines and empties streets, but it is the nighttime minimum that may matter more, because when the night stays hot the window for recovery narrows. The shallow, warming Gulf sea holds heat into darkness and returns it to humid air, so that the night feels less like relief than extension. This is the beginning of a new kind of fatigue: not exhaustion from work, but exhaustion without complete repair. Nothing catastrophic happens at once — a person still sleeps — but sleep becomes lighter and more fragmented, and night after night the deficit accumulates.

Sleep itself begins with cooling. Before sleep arrives, core temperature falls and the vessels of the hands and feet widen to shed heat through the skin; the brain prepares the body for surrender by shedding warmth. A body that cannot cool struggles to cross into deep sleep. And sleep is not uniform: deep sleep repairs tissue and regulates immunity; dreaming sleep consolidates memory and emotion — and a warm room does not merely make sleep uncomfortable, it alters its architecture. Elevated nighttime temperatures reduce both sleep duration and sleep efficiency — the proportion of time in bed actually spent asleep. In deep sleep, growth hormone rises, blood pressure falls, glucose resets; to shorten it repeatedly is to borrow against health. Children, whose sleep is developmentally vital, and the elderly, who cool less efficiently, pay most. This

is why air conditioning became, among other things, a technology of sleep — and why dependence on it is also a vulnerability: when the machine fails, the body is returned to a night it may no longer tolerate.

When sleep narrows, the mind is often the first place the loss shows. The brain is an organ like any other — wet, warm, energy-hungry — and heat reaches it through the systems that sustain it: blood flow shifts, hydration changes, sleep fragments. The mind in heat does not always break; it blurs. A labourer's decisions become less sharp, a student's retention weakens, a driver's attention drifts — not failures of character but of physiology. One striking study from Harvard followed students through a heatwave and found that those in non-air-conditioned dormitories performed measurably worse on cognitive tests than those in cooled rooms. The differences were subtle enough to resemble ordinary tiredness — and large enough to matter — and, tellingly, the gap was widest in the days just after the heat, when the un-cooled buildings kept holding their warmth. The burden, once again, carried forward.

If heat blurs thought, it bends feeling even sooner. A body working harder to hold its equilibrium has less margin for psychological flexibility; tolerance narrows, and irritability comes more easily. This is measurable. Across many studies, higher temperatures are associated with increased aggression, interpersonal conflict, and impulsive behaviour. Emergency visits shift. Psychiatric presentations sometimes increase. Heat does not "cause" violence or illness — poverty, crowding, and prior strain matter far more — but heat appears to act as an

amplifier, lowering thresholds so that other burdens become harder to carry. There is growing evidence, too, linking extreme heat with mental-health emergencies, including worsening of psychosis, mood disorders, and self-harm risk. The mechanisms are still being clarified, some direct and some working through sleep loss and social stress, but the direction of concern is clear: mental health is not insulated from climate.

All of this resembles something the body already knows — a fever that will not resolve. A fever is a controlled disturbance: the body raises its heat for a reason, then breaks it, sweating and cooling until repair follows. The important word is *resolved*. What climate imposes is a fever without authorship — heat the body did not generate and cannot fully regulate, with no pathogen to defeat and no endpoint written into it. By day the body sweats and strains as it would in fever; but where a fever would break at night, the environment may stay too warm to permit release, and the cycle stays open. Physiology depends not on constancy but on oscillation — effort and recovery, heat and cool — and heat without recovery simply accumulates. The kidney remembers it as dehydration, the brain as poor sleep, the mind as shortened patience, the heart as sustained strain. And because it is ordinary, it loses its meaning: the unfinished fever becomes invisible because it becomes familiar.

When enough people live inside that unfinished strain, it shapes the city itself. A hard day can be survived if the night restores; but if the night returns heat forward, the next day begins not from zero but from debt. The tired

driver is less patient, the nurse carries yesterday's lost sleep into decisions that require precision, the labourer begins already dehydrated. A thousand small impairments become social weather, and they fall unevenly. The wealthy sleep in sealed rooms with stable power; the poor may return from heat to crowded housing cooled by one ageing unit, each body adding warmth to the air. This may be one of the defining inequalities of the hotter century: not only who works in heat, but who can recover from it. To sleep safely is becoming a form of infrastructure — and infrastructure reveals itself most clearly in failure. This is the most intimate violence of warming: not that it burns, but that it follows us into the dark, and stays there long enough to change who we are by morning.

CHAPTER SEVEN

The Survivable City

By late afternoon the delivery rider waits outside the glass doors of a mall in Muscat, his motorbike still ticking with heat. Inside, the air is held at twenty-one degrees; families move through cool corridors, children run without sweating. Outside, it is forty-four. He stands in it because he must, entering only briefly — his work belongs to thresholds, arriving and leaving, touching coolness in passing. The glass behind him is almost transparent and thermally absolute: on one side leisure, on the other exposure. This may be one of the defining boundaries of the modern Gulf. Not wealth alone, not citizenship alone. Temperature.

This is a new kind of dividing line — not because inequality is new, but because climate is sharpening its consequences. In older cities the gradient between classes was narrower because the technology of escape was limited; everyone still shared broadly the same atmosphere. Air conditioning changed that categorically. And because heat shapes dehydration, sleep, cognition, mood, and the kidney, to be protected from it is increasingly to be protected from a growing share of climate's health burden. Cooling has become health infrastructure — and like much infrastructure, it is

distributed unevenly, most often along the lines of labour. The mall stays cool because the grid is maintained by workers who repair it in the heat; the food arrives because drivers move through hot streets. The cooled interior depends on bodies kept in the hot exterior. The two climates sustain one another.

As temperatures rise, that unevenness widens into what some now call cooling poverty — not poverty in the traditional sense, but a poverty of thermal protection. On current estimates, more than a billion people worldwide — around one in seven — already live at high risk from a lack of access to cooling, and the outdoor and migrant workers who build the cooled city are among the most exposed of all. In the hotter century, the right to safe sleep, safe work, and safe recovery increasingly depends on access to cooling. A survivable city must begin by seeing this: not all bodies meet the climate equally, and any honest heat policy must start from that fact.

For years the Gulf's answer to occupational heat has been simple: stop work at midday. The principle is sound. In Oman, outdoor work in exposed areas is prohibited from half past twelve until half past three, from June through August, under Article 16-3 of the Labour Law; the UAE, Qatar, Saudi Arabia, Bahrain and Kuwait run their own variants. The midday ban is not symbolic — it marks a moral line, that there are limits to what labour should be asked to endure. But heat does not obey the clock. Risk depends on humidity, wind, radiant load, and accumulated heat as much as on the hour: some days turn dangerous before noon; humid coastal evenings stay punishing long after the ban ends. A worker returning at

four may re-enter conditions nearly as harsh as those he left.

Here modern heat science offers a sharper instrument. The Wet Bulb Globe Temperature—WBGT—is less intuitive than the ordinary thermometer, but far more honest, combining air temperature, humidity, radiant heat, and airflow into a single measure of physiological stress. It asks not how hot the air is, but how hard it is for the body to cool itself within it. Codified in an international standard, ISO 7243, it is already used around the world to set work-and-rest regimes by measured risk rather than by the calendar. A fixed ban treats heat as time; a measured one treats it as exposure. Time is administrative. Exposure is biological. The body only understands the second.

The oldest protections — water, rest, shade — must be understood the same way: not as personal habits but as infrastructure, guaranteed before the individual acts. A water station should be as expected as scaffolding, and cool enough that the body will actually use it. Rest must be protected structurally, not left to shrink against the pressure of wages. And shade must be real — engineered, ventilated, accessible — not a narrow strip beside a truck; physiologically it changes everything, because the body stops absorbing direct solar load the moment it enters. None of these are extravagant technologies. What they require is not invention but priority — and priority reveals values. A city willing to engineer comfort for commerce but not recovery for labour is making a choice, whether it says so or not.

A survivable city also builds against heat before it cools. There is a difference between cooling a city and building against it: the first is reactive, the second structural. A building designed against heat asks first how much heat can be kept out. A reflective roof sheds the solar load a dark one stores; an insulated wall slows heat's entry; treated, shaded, well-oriented glass stops inviting in the radiant load a city then pays to expel. Between the buildings, asphalt and wide unshaded roads become thermal corridors, while trees, canopies, and arcades lower the radiant burden immediately — a city that plants shade is not beautifying itself but lowering physiological load. None of this abolishes heat; it lowers the baseline from which the machine must work. This is the principle the old house knew and the glass tower forgot: the machine should finish the job, not begin it. And resilience is measured not by what works when power is abundant, but by what remains survivable when systems strain.

Because cooling, once essential to survival, has become political. A wealthy family may move through summer almost without touching it — villa, car, office, mall — each space cooled, and another system waiting if one fails. For a migrant worker returning from ten hours outdoors to a room shared by six, the margin is thinner. Exposure is visible; recovery is where inequality hides. The same city offers different recoveries, and the deeper question beneath temperature is not only who is exposed, but who is allowed to recover. Subsidised cooling for vulnerable households, heat-resilient housing standards, worker accommodation designed for real

night recovery, urban shade treated as public infrastructure — these are not luxuries but forms of health policy. They reveal what a society believes survival should depend on: income, citizenship, occupation — or simply the fact of being human.

A survivable city is not the same thing as a wealthy city. This may be the hardest truth for the modern Gulf to hold. Wealth can build taller towers and stronger grids and buffer the protected from climate in ways earlier generations could scarcely imagine. But a city proves itself not in how well it protects the already protected, but in how little it asks the exposed body to absorb on its behalf. The road worker, the delivery rider, the cleaner, the migrant sleeping six to a room, the child in a schoolyard at noon — these are not marginal bodies. They are the true measure. Heat is impartial in physics but never in consequence: it enters every street, but not every body equally. To build a survivable city is therefore not simply to lower temperature, but to lower unequal burden — to ask, with unusual honesty, whose body is carrying the cost of comfort, and whether that cost has become too high. The Gulf has the wealth, the science, and the memory to answer that question better than most places on earth. The survivable city is not the one that defeats heat. It is the one that learns, finally, how to distribute it justly.

CODA

The Same Threshold, Now Felt

The door opens. Nothing has changed. The afternoon is still there — the light as white as before, the air rising from the pavement in quiet waves, the sea still breathing its warmth into the city. A delivery rider waits beside his motorcycle. A cleaner pushes a line of trolleys back toward the entrance. A compressor hums behind the wall, unseen but familiar. It is the same afternoon. Only the reader has changed.

The heat no longer appears as empty weather. It has acquired depth. The air now contains hidden stories: the kidney conserving water, the worker postponing thirst, the child sleeping because a machine is carrying heat elsewhere, the grandmother who once waited for the evening wind instead of a compressor, the body trying quietly to remain thirty-seven degrees while the world asks for more. None of this is visible. That has always been the nature of heat. Unlike smoke it leaves no stain, unlike floodwater no tide mark on the wall. It passes through the body almost silently, writing itself into sleep, into pulse, into organs that go on working long after the afternoon is forgotten.

Perhaps that is why we have misunderstood it for so long. We have looked at heat through thermometers instead of through bodies, measuring the atmosphere while overlooking the physiology living inside it. But the body has always known better. Every breath enters the lungs; every drop of sweat leaves the skin; every warm night alters the architecture of sleep. The border between environment and person is thinner than we imagine. We do not merely inhabit climate. Climate inhabits us.

This is not a reason for despair. Human history has always been, in part, a history of adaptation — and the Gulf itself is evidence of that capacity, few places having transformed so rapidly while remaining so shaped by their environment. The challenge now is different: not whether we can engineer our way out of heat, but whether we can remember enough of the body while we do. The future will bring better cooling, smarter buildings, cleaner energy; it should. But no compressor can teach us what thirst means, and no temperature reading can reveal what an afternoon asked of the body that lived through it.

In the end, heat is not the enemy of this book. Forgetfulness is — to forget that every city is first a place where bodies live, that comfort has a physiology, that survival is measured not only in infrastructure but in recovery, and that justice, sometimes, begins with something as ordinary as shade. When the door opens again tomorrow, the heat will feel exactly as it did today. The sun will not know a book has been written. The compressors will hum, the roads will shimmer, people

will hurry across parking lots and seek shade and return home when evening finally softens the day. Everything will appear unchanged — except that, perhaps, one more person will now understand that the story of heat has never been written in the weather alone. It has always been written in the bone.

CORDELIA APPARATUS

Notes & Sources

The scholarship for The Heat in the Bone lives here, underneath, and does not intrude on the prose above — the house standard set by The Salt in the Blood. Each note is keyed to an anchor phrase in the text. Only verified sources are cited; claims resting on standard physiology or engineering are marked as such. This is the Version 1.0 apparatus: it uses anchor phrases rather than numbered superscripts, which a later edition can add.

CHAPTER 1 — THE SURVIVABLE LIMIT

"the classical upper limit of human survivability was placed at thirty-five degrees wet-bulb" — The 35 °C wet-bulb ceiling originates with Sherwood & Huber (2010): the theoretical point at which a healthy person at rest, in shade, with unlimited water can no longer shed metabolic heat. [A]

"may begin closer to thirty-one degrees wet-bulb, even in young, healthy adults" — The first empirical test (Vecellio et al., 2022) found uncompensable heat stress in young, healthy adults at a mean critical wet-bulb of 30.55 ± 0.98 °C in humid conditions — well below 35 °C. [B]

"have already been recorded here … Bandar Mahshahr" — Raymond, Matthews & Horton (2020) found Gulf-shoreline sites have briefly reached ~35 °C wet-bulb; Bandar Mahshahr, Iran, is the most-cited instance (summer 2015). [C]

"one of the first regions on Earth where the old theoretical ceiling … has begun to matter" — Pal & Eltahir (2016) project wet-bulb extremes around the Arabian Gulf approaching and exceeding 35 °C under business-as-usual by late century. [D]

Body temperature (~37 °C) and evaporative-cooling physiology are standard physiology (Hall & Hall, 2020); the humid-heat framework underlying Chapters 1–3 follows Buzan & Huber (2020).

CHAPTER 2 — THE TWO TEMPERATURES

"The road itself may be twenty degrees hotter" — Conservative: low-latitude asphalt runs 25–26 °C above air under strong sun (Solaimanian & Kennedy, 1993). [E]

"The elderly regulate heat less efficiently … Medication can alter sweating" — Ageing reduces sweating and skin blood flow; chronic disease and common drugs (diuretics, beta-blockers, anticholinergics) narrow heat tolerance further. [F]

"cardiovascular deaths climbed from roughly a fifth … to well over half" — Pradhan et al. (2019): among Nepali migrant workers in Qatar, CVD deaths ran at ~22 % in the cool season and 58 % in the hot season, tracking afternoon heat; up to 200 of 571 judged preventable. [G]

Standard-instrument note: the shaded meteorological screen follows WMO practice; "feels-like" indices derive from Steadman's apparent-temperature work.

CHAPTER 3 — THE LEDGER OF THIRST

"His is a representative story" — The opening account is a composite drawn from the documented pattern of chronic kidney disease of non-traditional causes among heat-exposed workers, not a single identified patient.

"chronic kidney disease of non-traditional causes, or CKDnt" — The Pan American Health Organization's recommended name for the disease; it affects young men in heavy manual labour in the heat, without diabetes or hypertension, with a tubulointerstitial-fibrosis pattern on biopsy (Wesseling et al., 2020). [H]

"the geography of the disease followed heat as much as it followed farming" — The Mesoamerican epidemic concentrates in the hot Pacific lowlands among sugarcane cutters; occupational heat stress is identified as the single uniting factor; CVD mortality among men reached 60–70 per 100,000 in El Salvador and Nicaragua. [H]

"Biomarkers of acute kidney injury rose across work shifts" — Cross-shift kidney-function decline in Salvadoran cane cutters (García-Trabanino et al., 2015); at a Nicaraguan plantation each 1 °C rise in WBGT raised same-day clinically diagnosed AKI by ~18 %. [H, I]

"the kidney begins producing fructose … generates uric acid, oxidative stress, and inflammation" — The University of Colorado group's mechanism: heat-dehydration activates the renal polyol pathway to endogenous fructose; fructokinase then produces uric acid and injury. Fructokinase-knockout mice are protected. [J]

"The Gulf has no multi-year cohort … the evidence is no longer absent" — A longitudinal study of Saudi construction workers (Al-Bouwarthan et al., 2020) documents heat-related kidney injury across the working day. [K]

"Cardiac arrest. Natural causes. Renal failure. These are endpoints, not explanations." — Pradhan et al. (2019) note that recording heat-exposed workers' deaths as "cardiac arrest" obscures the cause. [G]

CHAPTER 4 — THE MACHINE THAT MAKES THE HEAT

"cooling can account for the majority of peak electricity demand … seventy per cent" — Saudi Arabia has the world's highest household-electricity AC share (~70 %); the IEA puts Middle East space cooling as high as ~70 % of peak demand on hot days. [L, M]

"Cooling consumes roughly a tenth of the world's electricity … triple by mid-century" — IEA, The Future of Cooling (2018): ~10 % of global electricity today; demand to more than triple by 2050. [L]

"takes heat from rooms where people are sleeping and returns it to the streets" — Modelling of Phoenix found AC waste heat raised mean night-time outdoor temperature by more than 1 °C, concentrated at night (Salamanca et al., 2014). [N]

"some thousands of times more powerful than carbon dioxide … the Kigali Amendment" — HFCs have global-warming potentials 1,000–10,000 × CO_2; the Kigali Amendment (2016) phases them down by >80 %, avoiding up to ~0.5 °C of warming by 2100. [O]

CHAPTER 5 — THE TOWER AND THE WIND

"the barjeel … badgir, malqaf, mungh" — The windcatcher uses pressure differentials to drive natural ventilation, sometimes over water for evaporative pre-cooling; measured cooling ~0.5–4.5 °C below ambient (Yazd). [P, R]

"five or six degrees cooler than the street" — Defensible for the combined wind-and-mass-and-shade system (barjeel alone: ~0.5–4.5 °C). [P, R]

"This is what modern physiology calls acclimatization" — Repeated heat exposure brings earlier and more dilute sweating, ~10–12 % plasma-volume expansion, and lower heart rate and core temperature at a given workload (Périard, Racinais & Sawka, 2015); evidence is strongest over days-to-weeks. [Q]

Thermal mass (heat delay), clay-jar evaporative cooling, and glass solar gain are standard building physics.

CHAPTER 6 — THE NIGHT THAT NO LONGER COOLS

"the nights themselves are growing hotter" — Night-time temperatures are rising and hot ("tropical") nights multiplying. (The diurnal range narrowed through the late 20th century, then reversed across ~half of land after ~1988; the robust claim is that nights are getting hotter, not that they warm faster than days.) [S]

"Elevated nighttime temperatures reduce both sleep duration and sleep efficiency" — Obradovich et al. (2017): +1 °C night-time temperature ≈ 3 extra nights of insufficient sleep per 100 people; Minor et al. (2022), across 68 countries, confirm warmer nights shorten sleep, worst for older adults and in warmer, poorer regions. [T, U]

"non-air-conditioned dormitories performed measurably worse on cognitive tests" — Cedeño Laurent et al. (2018): ~13 % slower reaction times and ~13 % lower arithmetic scores, with the gap widest on the cool days after the heatwave. [V]

"associated with increased aggression … Psychiatric presentations sometimes increase" — Heat is linked to hostility/aggression and to higher mental-health emergency visits (Nori-Sarma et al., 2022). [W]

"worsening of psychosis, mood disorders, and self-harm risk … heat appears to act as an amplifier" — Higher temperatures

are associated with increased suicide rates (Burke et al., 2018) and mental-health emergencies; the "amplifier, not cause" framing reflects the evidence. [W, and Burke et al., 2018]

CHAPTER 7 — THE SURVIVABLE CITY

"a poverty of thermal protection … one in seven" — SEforALL's Chilling Prospects 2022 finds one in seven people globally (~1.2 billion) at high risk from lack of cooling access, outdoor and migrant workers among the most exposed. [Y]

"In Oman, outdoor work in exposed areas is prohibited from half past twelve until half past three" — Oman Ministry of Labour, Article 16-3 of the Labour Law: 12:30–15:30, 1 June–31 August (fines OMR 500–1,000); UAE 15 June–15 September; other GCC variants. Critique of fixed-hour bans as insufficient: Human Rights Watch (2026). [X]

"The Wet Bulb Globe Temperature — WBGT … ISO 7243" — WBGT combines temperature, humidity, radiant heat and airflow and is codified in ISO 7243 for occupational heat-stress assessment. [Z]

Cool roofs, insulation, external shading and district cooling are established building science; the IEA's passive-cooling guidance [L] *supports the "the machine should finish the job, not begin it" principle. Cumulative (rather than isolated) heat exposure is demonstrated by the Chapter 3 cross-shift kidney studies.*

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About the Author

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He writes at the intersection of rigorous science, clinical insight, and reflective storytelling, seeking clarity without simplification. The Heat in the Bone is the second book in the Elements series, following The Salt in the Blood.

He is the founder of Cordelia Press.

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“Climate inhabits us long before we learn to measure it.”

The door opens and the heat arrives at once — not gradually, not as warmth, but as impact. In the Gulf, the distance between a cooled room and the street outside has become one of the sharpest divides in modern life: a line drawn not by walls but by temperature.

The Heat in the Bone follows that line inward, into the body’s narrow margin of survival, and outward, across the cooled cities and the workers who build them. It asks how a region came to live at the edge of human heat — and what one ordinary afternoon reveals about who the cool protects, and who it leaves outside.

Clear, humane, and grounded in the region’s own evidence, it is a short book about a large and rising silence.

Yahya M. Al-Farsi is Professor of Public Health and Epidemiology at Sultan Qaboos University, Muscat, and the founder of Cordelia Press.

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