



THE WORLD COOKING SYSTEMS ATLAS · CHAPTER 5

Heat and Browning

The three heat regimes, and the single transition each one risks

After this chapter, the next time a steak greys before it browns, a roast dries out before it crusts, a caramel jumps from amber to bitter, or a custard goes from set to scrambled — you'll know which of the three heat regimes was being asked to do the wrong job, and at which moment its transition was crossed.

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After this chapter, "medium-high heat" stops being a number to dial in and starts being a question to answer. You will know which of three regimes the dish is in, what each regime punishes, and where the line is between brown and burnt.

1 • The single most-lied-about variable in a recipe

A recipe says: *medium-high heat, eight minutes*. The home cook turns the dial to seven out of ten, sets a timer, and watches a fish fillet release water for eight minutes without ever forming a crust. The recipe was written by a chef who tested it on a gas range with a heavy carbon-steel pan and three hundred grams of fish. The home cook is using an electric coil, a thin nonstick pan, and four hundred and fifty grams of fish straight from the fridge. The dial is set the same. Almost nothing else is the same.

This is the most common heat failure in the home kitchen, and it is not the cook's fault. "Medium-high heat" is the laziest piece of vocabulary in the entire recipe-writing tradition. It pretends to describe a physical quantity. It actually describes the writer's hope. The writer is hoping that whatever surface temperature the writer's pan settled at, in the writer's kitchen, with the writer's volume of food, is what your pan will settle at too. It will not. Pans differ. Stoves differ. Volumes differ. Starting temperatures of the food differ. The dial number on the stove is a fiction, and the recipe writer half-knows it.

There is a better way to think about heat, and it does not start with the dial. It starts with **what the heat is doing to the food**. Heat in a kitchen is not one thing. It moves into food through three different physical pathways, and each pathway does a different kind of work. A cook who can name which of the three pathways a dish is using has stopped reading recipes literally and started reading them structurally. The dial number will still matter — but it becomes a tool, not a target.

The three pathways are convection, conduction, and radiation. Most home cooks have never been told these in plain language. In this chapter they are called the **convective regime**, the **contact regime**, and the **radiant regime**, because that is closer to how they feel from the cook's side of the pan. Each regime does one job well. Each regime has exactly one failure mode that catches cooks out. Most "the recipe didn't work" complaints are a regime question in disguise. The cook was in one regime and thought they were in another.

This chapter is the long version of that distinction.

2 • The three heat regimes

Most cooking is one of three regimes. The names matter less than the boundaries between them, but the names help the cook hold the distinctions in mind while the pan is hot. The three regimes are easier to feel than to define, and the easiest way to feel them is to start with what is touching what.

The convective regime is when the food is surrounded by a hot fluid — water, broth, steam, deep oil. The fluid is moving, even when it looks still, and the moving fluid transfers heat into the food evenly from every direction. A potato simmering in stock, an egg poaching in just-trembling water, a dumpling steaming over a wok, a chicken thigh confiting in low oil — all of these are convective. The food is bathed. Heat arrives from everywhere at once, and the temperature ceiling of the cook is the temperature of the fluid. Boiling water cannot exceed 100°C. Steam will not crack 100°C until it is pressurized. Oil can be pushed much higher, which is why deep-frying is convective but feels nothing like boiling — the *fluid* is different.

The contact regime is when the food is pressed against a hot dry or barely-wet surface. The pan is the boundary. Heat moves from the pan into the food through the bottom face only, fast and concentrated, while the rest of the food sits in air. A steak on cast iron, a pancake on a flat top, a piece of tofu in a thin film of oil, an egg fried sunny-side-up — these are contact. The pan is hot, the food is in contact with one face of the pan, and the contact face cooks differently than the air face. This is the regime where browning happens. This is also the regime where scorching happens. They are the same mechanism at different temperatures.

The radiant regime is when heat arrives without anything in between. The food is suspended in an oven cavity or beneath a broiler, and infrared waves move through air and strike the surface of the food. Roasting a chicken at 200°C, broiling a piece of fish, blistering peppers under the salamander, finishing a crème brûlée under a torch — these are radiant. There is no fluid bath and no pan-bottom. The heat comes from the walls of the cavity, the element above, or the flame. The food's surface heats fastest because it is directly exposed; the interior heats slowly through conduction from its own outer layer.

Most real dishes use more than one regime, in sequence. A roast chicken is contact (the sear in the pan) into radiant (the oven). A pasta dish is convective (the boiling water) into contact (the finishing pan) into off-heat (the resting bowl). A braise is contact (the brown) into convective (the long slow simmer in liquid) into radiant (the oven roof if it

is a covered Dutch oven in the oven). The cook who can name each transition can also name the moment to adjust the heat. The cook who cannot will keep one dial setting for too long and watch the dish miss its window.

A short table of what each regime does well and what it punishes:

Regime	What it does well	What it punishes	Typical recipe
Convective	Even cooking; gentle internal temperature; protein not seized	Surface browning (impossible — water caps at 100°C); collagen-poor cuts that need a quick sear	poaching, simmering, steaming, deep-frying, <u>carbonara</u> (the pasta side)
Contact	Browning, crust, Maillard reaction; quick rendering of fat; intense surface texture	Even interior cooking of thick foods; thin protein left on too long; uncrowded pan required	searing, pan-frying, griddle, <u>steak-au-poivre</u> , <u>yakiniku</u>
Radiant	Browning across a non-flat surface (a whole roast); slow drying of a surface to crisp it; controlled finish from above	Anything thin (it dries before it browns); anything wet on the surface (it steams in its own moisture); anything alone in a too-large cavity	oven-roasting, broiling, <u>creme-brulee</u> , <u>french-onion-soup</u> (the top under the broiler)

The table is a starting point. It is not the chapter. The chapter is the question the table makes possible: *which regime am I in, and which transition is about to happen?*

3 • The single risk of each regime

Each regime has exactly one failure mode that catches cooks out. Knowing the failure mode is more useful than knowing the regime, because the failure mode tells the cook where the line is.

Convective: the water boils off. The cook starts a sauce reduction at high heat, walks away, comes back, and finds the pan dry with a thin browned crust at the bottom. The convective regime worked while there was fluid. Then the fluid disappeared and the regime silently switched from convective to contact, and the contact regime started doing its work on a sauce that was not meant for contact. The cook returns to find scorch. The recipe never said "watch for the water to leave" because the recipe writer assumed the cook would notice. Most cooks do not notice, because nothing visibly changes until the regime has already switched.

The fix is to recognize the moment. A reduction is convective as long as there is fluid moving in the pan. The instant the fluid is no longer simmering — when the surface goes from rippling to glassy, when the bubbles slow from a rolling boil to a thick pop — the regime has just changed. The cook is now in contact, and the contact regime needs lower heat, constant stirring, or removal from the burner. A béchamel that thickens this way is fine. A wine reduction that gets here unattended is burnt. The transition is the dish's most fragile moment.

Contact: the surface crosses to scorch. Browning and burning are the same chemistry at different temperatures. Maillard reaction happens roughly between 140°C and 165°C on the surface. Caramelization of sugars happens between 160°C and 180°C. Above 200°C on a dry surface, the same reactions stop producing the brown-and-savory compounds the cook is after and start producing acrid, bitter compounds the cook is not. The transition has no sharp line. It is a continuum. Mahogany is good. Carbon is not. The cook is choosing a window, and the window is narrower than most recipes suggest.

The cook in the contact regime is reading two signals at once: the color of the food, and the sound of the pan. A pan that has gone silent is a pan that has dried out — the moisture is gone and the next thing it will do is scorch. A pan with a steady high sizzle is a pan with moisture still leaving the food into the fat. The transition from sizzle to silence is the warning. Some dishes want to go right up to that warning — a steak crust is closer to the line than a chicken thigh's crust — but knowing where the line is, and that the sound goes first, is most of the skill.

Radiant: the surface crosses to char. The radiant regime has the longest fuse and the most catastrophic ending. A chicken in the oven looks fine for forty minutes and then, in the last five, the wing tips go black and the breast skin splits. A piece of fish under the broiler is gorgeous at three minutes and inedible at five. The radiant regime accumulates color slowly until it doesn't, and then it accumulates all at once. The cook who only checks at the end finds char.

The fix is to check on a different schedule. Radiant cooking wants visual checks every few minutes once color starts, not a single check at the timer. The cook who has roasted a chicken at 200°C three times now knows that the skin shifts from pale to golden between minute thirty and minute forty, and from golden to mahogany between minute forty and minute fifty. After minute fifty, every minute matters more than the previous minute. The acceleration is real, and it is what catches cooks out. The recipe says "until golden brown." Golden brown is a forty-second window in an hour-long roast. The cook who has lived through one ruined chicken learns it.

4 • Browning, in plain language

The most useful single piece of vocabulary in this chapter is the word **browning**. It is the umbrella for several different chemical events that share an appearance. The cook does not need to know the chemistry in any detail, but the cook does need to know there are two main events and they prefer different conditions.

The first is the **Maillard reaction** — the reaction between amino acids (from protein) and reducing sugars (a kind of sugar that exists in many foods, not just sweet ones). This is what browns meat, what gives bread its crust, what darkens the surface of a seared scallop or a roasted onion. Maillard prefers a dry surface and temperatures between roughly 140°C and 165°C. Below 140°C, Maillard happens very slowly. Above about 200°C on a dry surface, it starts producing bitter compounds. The window is narrower than most cooks realize, and the most common mistake is to put wet protein into a pan and expect Maillard. Water on the surface holds the pan temperature at 100°C until the water is gone, by which time the cook has already given up on the sear and turned the heat up. Now the pan is too hot and the surface burns.

The second is **caramelization** — the reaction of sugars alone, without amino acids, at higher temperatures. Onions sweated slowly until brown are technically more Maillard than caramelization (their proteins are present); pure caramel from white sugar is pure caramelization. Caramelization happens between 160°C and 180°C and produces a different family of flavor compounds — deeper, more bitter at the edge, less savory. The two reactions live next to each other in most browned foods, and the cook does not need to separate them at the pan. The cook just needs to know that "browning" is not one thing, and that the conditions for it — dry surface, sufficient heat, enough time at the right temperature — are the same regardless of which reaction dominates.

A useful ladder for thinking about the visual progression of browning:

Pale — the surface has lost its raw look but has not begun to color. This is what wet protein in a too-cold pan stays at forever.

Golden — early Maillard. The surface has begun to gather color. Flavor is starting to develop. For chicken skin or a piece of bread, this is often the stopping point — the dish still wants more interior cooking but the surface is where the recipe asked for it.

Mahogany — deep Maillard, well-developed crust. The surface flavor is at its peak. This is what a steak crust is going for. This is what an oven-roasted chicken wants on the wing tips and the breast skin.

Dark — the edge of useful browning. Bitter notes are beginning to enter the flavor. Some dishes want this — a deeply charred peeled pepper, the black bits on the edge of a yakiniku slice, the rim of a tarte tatin's caramel. Most dishes do not.

Carbon — past the point. The surface is producing burnt, acrid compounds and the dish is taking on a bitter undertone that no amount of seasoning will fix.

The ladder is a description, not a target. Different dishes stop at different rungs on purpose. A creme brûlée's top is mahogany at the edge of dark, and that is the point. A piece of fish wants golden, and dark is a failure. A steak crust wants mahogany, and pale is a failure of conviction. The cook who can name the rung the dish is asking for has solved a problem most cooks don't know they have.

5 • Recipes, read for their heat regime

The recipes below are linked to the site, and the paragraph after each link is a reading of what the dish is doing with heat. This is the same approach as the seven-axis readings in Chapter 1, but the lens is narrower: which regime, which transition, which failure point.

Steak au poivre — the contact regime, decisive

A steak crust is the contact regime at its most demanding. The pan must be at the high end of Maillard — somewhere in the 180–200°C range on the bottom face of the meat — before the meat goes in. The meat must be dry; any surface moisture will hold the pan at 100°C until it boils off, during which time the rest of the steak overcooks. The cook commits, presses the meat down, and does not move it for the first ninety seconds. The decision is binary: the crust either forms or does not. The peppercorn coating intensifies the contact's effect, because the cracked pepper makes a textured surface that holds more Maillard sites than a smooth one. The pan sauce that follows is convective and short — wine and cream in the same pan, with the fond on the bottom dissolving into the liquid. Two regimes, in sequence, in under ten minutes. For internal doneness on whole-cut beef, carryover-cooking is the part most home cooks underestimate: pull the steak at 50–53°C internal for medium-rare; it will climb another 3–5°C while resting. (Whole-cut beef can be cooked to medium-rare safely. Ground meat cannot — see § 7.)

French onion soup — caramelization as the dish

Most savory recipes use browning as a step. French onion soup uses browning as the *substance*. The onions are sweated slowly in butter and a small amount of oil, in a heavy pan, for forty-five minutes to an hour. The cook is not cooking the onions; the cook is conducting a long, slow Maillard-and-caramelization on them. The heat is just below the line where the bottom would scorch. The cook stirs, deglazes with small splashes of water when the fond on the bottom darkens, and waits. The dish's depth is the dish's color: a pale, watery onion soup is a soup with no Maillard performed on it, no amount of beef broth will rescue it. After the onions are dark, the regime shifts — broth is added (convective), the soup simmers briefly to integrate, and the bowl is finished under the broiler with bread and cheese (radiant). Three regimes in one bowl, each doing a different job, and the long contact-regime step is what the dish is named after.

Crème brûlée — radiant heat as theater

The custard itself is convective — baked in a water bath at low oven temperature, the surrounding water holding the cavity at a gentle ceiling so the custard sets without cracking. But the dish is named for what happens next. After the custard is cold, a thin layer of sugar is sprinkled on top and the sugar is taken to dark caramelization with a torch or under a broiler. This is the radiant regime used for the smallest possible job — a thin sugar surface, ten seconds at full power, transforming from pale to dark in less time than the cook expected. This is the regime's character on display: it accelerates at the end. The dish is convective for an hour and radiant for ten seconds, and the ten seconds is what the diner remembers.

Bacalao al pil-pil — contact at the edge of breaking

Salt cod, olive oil, garlic, chili. The fish is laid in warm — not hot — oil, skin-side down. The cook is using contact at its lowest functional temperature. If the oil is too hot, the fish curls and gives up its gelatin too fast and the emulsion will not form. If the oil is too cold, the gelatin will not release at all. The window is roughly 70–80°C of oil. After the fish is gently cooked through, it is removed, and the oil is whisked with the gelatin and a small amount of fish liquor to form the emulsion. This is contact used not for browning but for slow gentle rendering. The dish never gets above the temperature where Maillard begins.

Carbonara — convective into contact into off-heat

Pasta in salted boiling water (convective). Guanciale rendering in a dry skillet (contact, but at low heat — the rendering wants slow). The pasta is drained, the hot pasta meets the guanciale and its rendered fat (contact, with the pasta water added to create a thin emulsion). And then the pan is pulled off the heat — completely off — before the beaten egg and cheese mixture is added. This is the load-bearing moment of carbonara, and it is the one most home cooks get wrong. The pan must be off the burner, with residual heat only, when the egg goes in. If the pan is on the burner, the residual heat is supplemented by ongoing heat, and the egg cooks past the silky thickness of a sauce into the scrambled curd of a mistake. The cook is using *the absence of one regime* as a tool. The pan is no longer contact; it is no longer convective. It is in the off-heat moment that the dish requires.

Clam chowder — convective with mixed protein

A chowder is convective from start to finish. Onion and bacon render briefly in contact, then potatoes and clam liquor and milk join (convective). The clams are added at the very end. Clams cook in under three minutes; a clam left in the pot for ten is rubbery. The chowder simmers gently, never a rolling boil, because dairy at a hard boil breaks.

The lesson is the mixed protein: the onion can sit in the broth for an hour, the potato for fifteen minutes, the clam must arrive last. Three proteins, one regime, three different windows.

Tarte tatin — caramelization carried through a bake

The apples are caramelized in butter and sugar on the stove top first — contact regime, deep caramelization, mahogany at the edge of dark. Then the pastry is laid over and the whole pan goes into the oven (radiant). The dish is read upside-down: when inverted, the dark caramel surface is the top of the tart. The risk is the moment of inversion — too soon and the caramel has not yet set, too late and it has cooled to candy. Two regimes in sequence, and a third risk in the unmolding.

Yakiniku — contact distributed across the table

A grill at the table, small pieces of meat cooked in seconds at high contact heat by the diner themselves. The cook has prepared the components — sliced the meat thin enough that contact-cooking is the right regime, made the sauces, set out the vegetables. The cooking is delegated to the diner, in pieces small enough that the contact regime can complete its work in fifteen to thirty seconds per side. The lesson is slice thickness: at the right thickness for the regime, the meat browns and finishes simultaneously; at the wrong thickness, it either browns and stays raw, or cooks through and stays pale. The dial is fixed; the geometry of the meat is the variable.

6 • Reading a new dish for its heat regime

The cook who has read this far now has a small but reusable habit available to them. Before starting any unfamiliar recipe, take thirty seconds to read it for the regime sequence. The questions are short.

Which regime is the dish in for most of its cooking time? Braised? Convective with a contact entry. Roasted? Radiant with possibly a contact entry. Sautéed? Contact throughout. Boiled? Convective. The regime answers what the dish is doing at the level of physics.

Are there transitions, and where? A roast chicken transitions from contact to radiant. A risotto transitions from contact (the toasting of the rice) to convective (the slow addition of stock). The transitions are the moments where the cook's attention is most required.

What is each transition's failure mode? The convective-to-contact failure is the water boiling off. The contact's failure is scorch. The radiant's failure is char. The cook who has named the transitions has also named the moments to watch.

What is the dial doing, and is the dial enough? Some dishes need the dial to move during the cook — pulled higher for the sear, dropped for the braise, pushed up again for the reduction. A cook who reads the regime sequence first knows in advance which dial moves are required.

This is a small habit. It takes one slow breath. It changes nothing about the recipe. What it changes is the cook's posture in front of the pan: from someone *following* a sequence to someone *anticipating* it. By the tenth dish, the posture is automatic, and the recipe-writer's vague "medium-high heat, eight minutes" has become the cook's clear *contact regime, surface to mahogany, sound first*.

7 • The doneness windows, and the safety floor

Almost every conversation about heat eventually arrives at internal temperature. This is a place where home cooking and food safety overlap, and where the home cook has a responsibility the recipe writer often fails to communicate. What follows is not a chef's preference. It is the floor.

Ground meats, poultry, and pork must be cooked through. Ground meat distributes any surface bacteria throughout the patty, which is why a steak can be cooked rare and a hamburger cannot. Ground beef, lamb, pork, chicken, turkey — all of them are cook-through preparations. The target is 70–74°C internal, held momentarily. There is no "medium" doneness for ground meat. There is no "to your liking" for chicken. This is not a stylistic choice. It is the safety floor.

Whole-cut beef and whole-cut lamb can be cooked to medium-rare safely. A steak is a whole cut: bacteria live on the surface, and the surface is cooked by the sear. The interior can remain at 50–55°C — the medium-rare window for beef — without risk. The same logic applies to lamb chops and roast lamb (60–65°C internal for medium). It does not apply to ground versions of either.

Whole-cut pork is the case most home cooks are still uncertain about. Modern guidance, where trichinella is no longer the risk it once was, permits whole-cut pork at around 63°C internal with a brief rest. Ground pork, again, is the exception — cook through to 70–74°C.

Chicken is cook-through, regardless of cut. Whole bird, breast, thigh, wing — the target is 74°C internal at the thickest point. Pink juice from a chicken is undercooked chicken. A thermometer is the right tool here, and one of the cheapest pieces of equipment that will change a cook's life.

Fish has two paths. **Sashimi-grade**, properly frozen to anisakis-killing temperatures (typically -20°C for 24 hours by commercial standards), can be eaten raw or near-raw. **Non-sashimi-grade fish** is a cook-through preparation, target 60–65°C internal. The home cook who buys fish from a supermarket should treat it as cook-through unless the label says otherwise.

Soft-yolk eggs — poached, soft-boiled, sunny-side-up, the runny yolk of a carbonara or a hollandaise — are a stylistic choice that comes with a caveat. They are not suitable for vulnerable populations: pregnant people, the immunocompromised, the very young,

the very old. For those diners, eggs should be cooked through or made with pasteurized egg products.

A short table of useful internal temperatures:

Item	Target internal temperature	Notes
Beef steak (whole cut)	50–53°C for medium-rare; 55–58°C for medium	Pull 3–5°C low and let <u>carryover cooking</u> finish the job.
Lamb (whole cut)	55–60°C for medium-rare; 60–65°C for medium	Same carryover logic.
Pork (whole cut)	63°C with a rest, for medium; 70°C for well-done	Trichinella risk is low in modern pork supply but not zero in all regions.
Ground meats (beef, lamb, pork, poultry)	70–74°C, no exceptions	No medium. No rare. Safety floor.
Chicken (any cut, whole bird)	74°C at the thickest point	Pink juice means undercooked. Use a thermometer.
Fish (non-sashimi-grade)	60–65°C	The flesh is opaque and flakes.
Fish (sashimi-grade)	Raw or seared rare, cook's choice	Must have been frozen to anisakis-killing temperatures.
Eggs (soft yolk)	Yolk barely set, around 63°C	Not for pregnant, immunocompromised, very young, very old.
Eggs (cooked through)	Yolk fully set	The default for institutional and vulnerable-population cooking.

The doneness window is not a chef's secret. It is information the home cook has the right to. The recipe writer who omits it is doing the cook a disservice. A thirty-dollar instant-read thermometer is the most important piece of equipment in this chapter, and the only one this chapter recommends buying.

8 • Common misunderstandings

"Higher heat is faster cooking." Often the opposite. Higher heat browns the surface faster than the interior can warm. A chicken thigh at very high heat will char on the skin while the meat near the bone is still cold. A moderate oven for longer will often deliver an interior at temperature with a surface still in the right window. High heat is for thin or quick foods.

"The pan should be smoking before the meat goes in." A pan smoking over its smoke point is producing acrid compounds and is past the temperature where Maillard works cleanly. The cook wants the pan hot, not smoking. The test: a drop of water flicked on the surface dances in beads, does not evaporate instantly, does not pool. At home, with butter or olive oil, the smoking pan is past the line.

"Resting meat is just a tradition." It is not. After meat comes off heat, the temperature continues to climb for several minutes — carryover cooking — as heat conducted into the outer layers moves toward the center. A steak pulled at 50°C will finish at 53–55°C while resting. The cook who does not rest is cooking the meat to its final temperature while it is still in the pan, which means the surface is overcooking past the point the cook wanted.

"The dial number means the same on every stove." It does not. A "medium" on a gas range and on an electric coil and on an induction hob can be three different surface temperatures. The cook learns the stove, not the dial.

"Browning is just for looks." Browning is the visible signal of flavor compound formation. The brown crust on a steak contains compounds that did not exist in the raw meat. A piece of meat that is "medium-rare but pale" is medium-rare meat that the cook never let develop crust flavor. Browning is the dish's flavor signature.

"All ovens hold their set temperature." Most do not. Most home ovens overshoot and undershoot their target by 10–20°C in a cycle, and many are calibrated wrong by 15–20°C in a fixed direction. An oven thermometer is the second-most-useful piece of equipment in this chapter. The cook who has measured their oven knows that "180°C" on the dial is actually 165°C, and adjusts.

9 · Chef's view

In the open-fire restaurant I worked in for a season in Hanoi, the head cook would never let me touch the broth pots without a hand on the side of the pan first. He would press his palm against the metal, feel the temperature, and then nod or not. If the metal was hot enough that his palm came away in under three seconds, the broth had passed into a simmer too aggressive for the bones; he wanted it slower. If the palm could stay for five seconds without flinching, the broth was where he wanted it. He would never have phrased it as "85°C." He phrased it as *three seconds is too fast*.

I watched him do this maybe two hundred times that season, and I came to understand that the dial on the stove was a stranger to him. The temperature he cared about was the temperature of the food. The only instrument he trusted for measuring it was his hand on the pan and his eye on the surface of the broth. He could tell from across the room when a pot had started to scorch, because the sound had changed.

I think about that hand-on-the-pan often. The home cook with a thermometer and an oven gauge can replicate, instrumentally, what that cook could do by attention. The thermometer is faster for someone who has not yet built the attention; the attention is faster for someone who has. The point is that **the dial is not the variable**. The food is the variable. The pan is the variable. The cook is the variable.

One more thing. The hardest sentence for a cook to say at the stove is *the heat is wrong*. It feels like an admission of failure: the recipe said medium-high, you set medium-high, and the dish is not doing what it is supposed to. The cook is tempted to push on and hope the dish recovers. It rarely does. The skill is to **adjust mid-dish**. Pull the pan off the burner for thirty seconds. Drop the dial two notches. Move the food to a cooler corner of the pan. The recipe will not say to do this, because the writer did not know what your stove was doing.

This is what controlling heat actually is. Not the dial. The attention.

10 • Diagrams and tables (proposed)

This chapter, when it goes to layout, will use three visualizations. They are sketched here in text for the writer's reference.

Diagram 1 — The three regimes. A simple three-panel illustration. Panel 1 shows food submerged in fluid with arrows of heat from every direction (convective). Panel 2 shows food pressed against a pan surface with arrows from below only and air above (contact). Panel 3 shows food in an oven cavity with wavy lines from the walls and upper element (radiant). Each panel labels what the regime does well and what it punishes.

Diagram 2 — The browning ladder. A vertical strip showing five color swatches, top to bottom: pale, golden, mahogany, dark, carbon. Beside each rung, a one-line description of which dishes aim for that rung. The ladder makes visible what the recipe writer rarely says: *how brown is brown enough*.

Diagram 3 — The doneness window strip. A horizontal temperature strip from 40°C to 80°C, with shaded zones for beef, lamb, pork whole-cut, chicken (with a vertical line marking the safety floor), and ground meats (shading begins only at 70°C). A reader can see at a glance that ground meats live in a separate, higher zone, and that the home cook's "I like it medium" applies to whole cuts only. The single most useful diagram in the chapter for the home cook's safety.

11 • Summary

The reader who has finished this chapter has gained, at minimum, four things.

First, the language of regimes. Convective, contact, radiant. Each does one job well, each has one failure mode, most dishes use more than one in sequence. The cook who can name the regime has stopped reading recipes literally.

Second, the browning ladder. Pale, golden, mahogany, dark, carbon. Dishes ask for different rungs on purpose. The cook who can name the rung has stopped guessing at the crust.

Third, the doneness floor. Ground meats, poultry, and pork are cook-through. Whole-cut beef and lamb have medium-rare windows. Fish has two paths — sashimi-grade or cook-through. A thermometer delivers the window.

Fourth, the posture. The cook reads a new recipe for its regime sequence, identifies transitions, anticipates failure modes, corrects the dial in real time. The translation from "medium-high heat" to *contact regime, surface to mahogany, watch the sound* is permanent.

12 • What comes next

The next chapter of this Atlas is about **acid and brightness** — the axis touched on in Chapter 1 (§2), revisited in depth. Chapter 5's heat releases the volatile aromas; Chapter 6's acid arrives on the plate to tell the eater the dish was just made. Heat builds depth. Acid delivers arrival. Together they are how a dish lands.

For the cook who wants to keep practicing, the next dish you make: before turning the dial, name the regime. As the dish progresses, name each transition. When something looks wrong, name the failure mode. The naming is more than half the skill.

Heat is not the dial. Heat is what the food is being asked to do, by what, for how long, against what surface. The cook who has read this chapter is now asking the right question. The answers will arrive at the pan, dish by dish, for the rest of their cooking life.

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