

The
GREAT ANIMAL
ORCHESTRA

FINDING THE ORIGINS OF MUSIC
IN THE WORLD'S WILD PLACES



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Sonnet VIII

William Shakespeare

*Music to hear, why hear'st thou music sadly?
Sweets with sweets war not, joy delights in joy.
Why lovest thou that which thou receivest not gladly,
Or else receivest with pleasure thine annoy?
If the true concord of well-tuned sounds,
By unions married, do offend thine ear,
They do but sweetly chide thee, who confounds
In singleness the parts that thou shouldst bear.
Mark how one string, sweet husband to another,
Strikes each in each by mutual ordering,
Resembling sire and child and happy mother
Who all in one, one pleasing note do sing:
Whose speechless song, being many, seeming one,
Sings this to thee: "thou single wilt prove none."*

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PRELUDE

Echoes of the Past



It is sixteen thousand years ago, and the plains teem with life. With the presence of the giant armadillo, American cheetahs, saber-toothed tigers, giant beavers, mastodons, camels, caribou, dire wolves, and ground sloths that stand as high as fourteen feet on their hind legs, wildlife is everywhere. Humans haven't made their appearance in North America yet, but birds in great numbers—including pied-billed grebes, storks, Canada geese, ducks, teals, common crows, turkeys, bobwhites, and dowitchers—fill the air with flight and song, while tree frogs, peepers, insects, and reptiles saturate the sound field with the intricate tapestry of their voices.

It is the end of an ice age, and the leading edge of the massive Wisconsin glacier slowly recedes to the Arctic Circle. With the earth's warming, the floral world thrives. Pine, oak, and spruce trees, along with larch, aspen, balsam, and poplar, have advanced far to the north along with low-lying shrubs and grasses. The

first signs of the boreal forest have taken root in the Western Hemisphere—it thrives through the cold winters and the warm summers, and it is jam-packed with nonhuman life, whose individual voices coalesce into an intense and collective symphony.

In the heart of the young forest, an area surrounding a small stream is luxuriant and green, set under a deep-blue sky with a few tufted clouds; it is infused with the gentle warmth of a summer breeze. This habitat is densely populated with creature life; in fact, at this time, animal life—both numbers of species and individual creatures—is at a numerical peak in our planet’s history. In this one verdant spot thousands of creatures sing in choruses at all times of the day and night. The visual spectacle is impressive, but the sound is absolutely glorious.

This place conveys a complex sonic narrative loaded with significant messages for any sentient being within earshot. The sounds expand to their greatest volumes at dawn and dusk—a loud-soft-loud progression that would be familiar to modern listeners of many styles of music.

Animals are hooting, bleating, growling, chirping, warbling, cooing. They are tweeting, clucking, humming, clicking, moaning, howling, screaming, peeping, sighing, whistling, mewling, croaking, gurgling, panting, barking, purring, squawking, buzzing, shrieking, stridulating, cawing, hissing, scratching, belching, cackling, singing melodies, stomping feet, leaping in and through the air, and beating wings—and doing it in a way that each voice can be heard distinctly, so that the animals seem able to hear and to distinguish one voice from another. The only sound louder than their collective chorusing is the howling wind of a great storm, a clap of thunder, an erupting volcano. The sound of water—a nearby stream—is the one constant nonbiological acoustic signature of the surroundings.

Then the ground shifts unexpectedly; a low, ominous rumble causes leaves in the upper stories of the trees to rustle for a moment like hundreds of muted castanets. Groups of insects and frogs suddenly become very quiet. But birds cry out, abandoning their well-ordered choral hierarchy and scattering in every direction; the air above explodes with the rush of staccato-like wing beats and cries of alarm. Throughout every fiber of each animal courses a sense of unfamiliar danger. Roaming predators steal into view, magnifying the tension of the moment.

Each organism is enveloped in more waves of sonic energy—great vibrations that come from everywhere—above, around, and below the ground itself. Predators take advantage of the moment to pursue those that are less agile and stunned by the earth's motion. The dominant opportunists—the lions, bears, raptors, and teratorns (with a wingspan of sixteen feet)—generate thundering footfalls and powerful edge-tones from fluttering wings as they propel themselves into the air and crash through the vegetation after their doubly terrified prey. Then come the final cries of the vanquished, a new message that punctuates the moment.

The world's waters—its oceans, lakes, rivers, estuaries, and coastal mangrove swamps—are packed full with fish, amphibians, reptiles, mollusks, mammals, and crustaceans, along with anemones and calcium carbonate coral structures that nurture and shelter many communities of smaller organisms. The ecosystems that rely on the contributions of marine organisms mark every shore. Like the habitats on land, these, too, are bursting with sound.

The Gulf of St. Lawrence, where that river and the Atlantic join, is home to thousands of species. The typical cod measures six or seven feet in length and weighs more than two hundred

pounds. But it can hardly swim any distance without careening into another body, the waters are so vividly heaving with fish. Some bluefin tuna outstrip the cod, with adults measuring more than twelve feet long and weighing over fifteen hundred pounds. Plentiful, too, are the smaller herring and haddock, capelin, salmon, halibut, mackerel, shad, sea turtles, and even tiny smelt. Upriver are the striped bass, sturgeon—individuals can weigh as much as a thousand pounds—and trout. The ocean-dwelling fish supply food sources for the seals, dolphins, and larger toothed whales, while their baleen counterparts rely on krill, copepods, euphausiids, and cyprids.

Abundant sound is complete across the breadth of this marine environment. Some of the fish create acoustic signals with their swim bladders. Others signify their presence by gnashing their teeth. But each fish species generates a unique pressure wave through the oscillation of its tail fin—a signature sound recognized by others in the gulf, especially predators. With water limiting vision, sound is crucial to these animals' survival and reproduction, just as it is on land. From animals as small as protozoa, copepods, and phytoplankton to large whales, each species creates an acoustic sound-mark. The world's waters are saturated with living chatter, sighs, drumming, glissandos, cries, groans, grunts, and clicks.

Closer to the equator, coral reefs abound and make up a significant living mass. And they, too, pulsate with sound. Anemones, damselfish, three-spot dascyllus, and clown fish; parrot fish, wrasses, puffers, cardinalfish, grunts, triggerfish, fusiliers, goatfish, butterfly fish, red drum fish, many kinds of surgeonfish, jacks, sharks, snapping shrimp, and black drum fish—each leaves a

distinct acoustic impression that, when combined with the others, forms part of a chorus that is set in the subtle acoustic background ambience generated by waves at the surface. Out in the open ocean, the songs of humpback, blue, and right whales are so loud that if unimpeded by landmasses—and when weather and ocean-current conditions conspire to moments of perfection—their voices could circle the earth in just under seven hours. The only sound louder than this combined contingent of mammals, fish, and crustaceans is the raging effect of a hurricane, typhoon, or tsunami.

The ready food supply in this marine environment supports an abundance of shorebird populations and, in the process, the attendant racket. There is the great auk—also called a spearbill—a stately flightless creature that has long since abandoned the air, given that it is a great swimmer. Nearby ocean-based food is so plentiful that it need not waste valuable energy flying to distant places. Then there's the raucous *ow-ow-ow* of the shearwaters mixed with the unique voices of puffins, gulls, terns, gannets, petrels, skuas, kittiwakes, fulmers, murre, and cormorants, creating a din that seems to make each vocalist indistinguishable from another. But it's a curious deception: these are the sounds of survival, reproduction, and communication, and each species has evolved so that it is heard distinctly among the others—and so that it projects over the thunderous, turbulent sounds of the ocean waves.

Mangrove swamps—saline woodlands that hug the subtropical and tropical coastal waters of every continent except the Antarctic—pulsate with curious mixes of insects, mammals, birds, and crustaceans. As the tides recede in these Mesoamerican

biomes, crabs lose their grip on the branches and trunks of trees, falling with the distinctive *plop* of a large, flat, round stone into the exposed muddy sediment below. The crabs will return to the trunks and branches when they become submerged again, on the next incoming tide. When night falls, frog choruses swell and bats *ping* their echolocation signals in order to find edible insects in the dark. Barnacles clinging to the exposed rocks and mangrove roots twist noisily in their shells, causing tiny high popping sounds that resonate throughout the habitat above and below the waterline. Even at night, when the creatures are enveloped in darkness, many voices persist, competing for recognition.

Glacial ice still covers much of the planet north of the Arctic Circle, even as the planet warms. It's a cold and desolate place, five to ten degrees colder than it will be some sixteen millennia from now. The receding layers of ice carry with them spores and seeds from the recovered landscape. While these will impregnate the moraine once it becomes fertile enough to spawn the boreal forests of the Arctic's future, there is not much acoustic life on the surface. But even this environment is not quiet: explosive sounds occur when crevasses—deep elongated cracks—form in the glacial span. The ice mass shatters as it is compressed under great pressure and undergoes periods of melting and snow accumulation, and in addition to the startling popping and groaning of the ice and the ever-present wind and frequent storms, calving glaciers release huge walls of frozen water into the shorelines of rivers, fjords, and seacoasts with a volatile, thunderous burst of sound, the fallen accumulation generating huge waves in the water below. Then there is the sound of the glacier's own