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Jason Earle

The Evolution of Bioaerosol Sampling

Jason Earle, indoor air quality entrepreneur and founder of 1-800-GOT-MOLD and Got Mold, joined IAQ Radio to discuss the evolution of bioaerosol sampling, the limitations of current mold assessment tools, and the innovations his company is pursuing. A central theme throughout was the need to move from reductionist, species-focused thinking toward a systems-based, ecology-aware approach to building health assessment.

Jason Earle's Background and Entry into IAQ

- **Childhood illness:** At age 4, Jason lost significant weight and was initially misdiagnosed with **cystic fibrosis** based on family history and symptoms; six weeks later, a second opinion confirmed **asthma, pneumonia, and allergies to nearly everything**.
- **Spontaneous remission:** All symptoms disappeared after his parents separated and he moved out of the "musty old farmhouse" — attributed at the time to "spontaneous adolescent remission," which Jason characterizes as a medical euphemism for an unexplained outcome.
- **Career origin:** Former Wall Street professional whose dot-com bubble exit led to a personal epiphany about buildings and health, not a planned career path.
- **Triggering moment:** While traveling in Hawaii, Jason read local coverage of the **Hilton Kalia Tower mold scenario** and a story about a 40-year-old former employee who developed adult-onset asthma and new allergies — this mirrored his own childhood experience and prompted an obsession with the idea that buildings can make people sick.
- **Core insight:** The obsession was not specifically about mold species but about the broader concept that the built environment — homes and workplaces — directly drives human health outcomes.
- **Early career:** Took a job with a basement waterproofing contractor doing mold mitigation; became deeply troubled by their approach of wholesale

demolition, heavy chemical use, and outcomes he believed left homes worse than before.

- **Pivot to assessment:** Moved into the mold assessment industry specifically to serve as a buffer between contractors and consumers, seeking more surgical, minimally destructive detection methods.
- **Mold detection dogs:** Introduced mold-sniffing dogs as an investigative tool — received significant industry pushback at the time but remains a strong advocate for their unique ability to locate hidden mold that no other tool can reliably find.

Industry Critique: What Has and Has Not Changed in 20+ Years

- **Dominant problem — reductionism:** The industry remains fixated on species identification, colors, and mycotoxins — a reductionist framework analogous to siloed medical specialties that treat individual organs in isolation.
- **Fear-based narrative:** This reductionism has perpetuated a fear-driven approach focused on "is mold present?" rather than the more meaningful question of where moisture is coming from, which is the true root cause.
- **Moisture is root cause:** Dampness — not mold itself — is the actual driver; mold is a symptom of a moisture problem, and that distinction must be front and center in every investigation.
- **Dampness as a "pool party":** A damp indoor environment invites mold and all its byproducts (MVOCs, beta-glucans, secondary metabolites), bacteria, allergen proliferation, pest intrusion, building material degradation, and release of otherwise stable VOCs — a full chemical and biological potpourri.
- **Education has declined:** Jason's view is that licensing in the industry has actually lowered the bar rather than raised it; IAQA courses from the early days were superior to most current licensing curriculum he has reviewed.
- **Technology stagnation:** The industry is still using 1999-era technology for mold assessment while the broader world has moved from paper maps to GPS, analog to digital, and human genome sequencing has dropped from \$1 billion to \$200 — a 100,000-fold cost reduction.
- **Paradigm shift underway:** The emerging convergence of modern genomic technology with standard approaches is enabling a shift from asking "are these species here?" (e.g., ERMI) to asking "what's here?" — a fundamentally more powerful question that yields better answers and outcomes.

ERMI: Limitations and Concerns

- **Origins less robust than advertised:** The ERMI panel's 36 species were derived from an original set of 89 molds identified in just six homes in Ohio; the panel was reduced to 36 because a larger panel would be too expensive, then collapsed into a compound sample from two rooms combined — which undermines diagnostic capability.
- **A priori design flaw:** ERMI is an a priori test — species were selected in advance rather than discovered through open-ended analysis — which limits what it can reveal.
- **Counting methodology problem:** The MSQPCR method used in ERMI counts broken pieces of organisms as whole organisms, potentially inflating results and generating false alarm signals.
- **Low field validation rate:** When Jason investigated homes with high ERMI scores using dogs, thermal imaging, and other tools, he was able to validate commensurately concerning conditions in fewer than 10% of cases — a deeply troubling finding.
- **EPA's own position:** The EPA explicitly states ERMI is a research tool and should not be used for building diagnostics — Jason fully concurs.
- **Harm in practice:** ERMI has been adopted by some functional medicine practitioners as a sales tool driving detox protocols and remediation work that may be unnecessary, causing real harm to patients and property owners. ERMI is like driving a car in the dark with a laser beam rather than headlights.

Spore Traps: Appropriate Use, Limitations, and Responsible Practice

- **Snapshot, not a diagnosis:** A spore trap captures what is in the air at the moment of sampling — analogous to a photograph of a river; accurate at that instant but the river is always changing, so the snapshot should never be treated as a complete or permanent characterization.
- **Cut point gap:** Standard spore traps capture particles in approximately the 2–200 micron range, missing submicron particles that are deeply respirable and potentially the most hazardous; research suggests mycotoxin concentrations in submicron particles are 340 times higher than in larger particles.
- **Hidden mold limitation:** Spore traps do not find hidden mold; the only tool Jason is aware of that can effectively locate hidden mold is a well-trained mold detection dog.
- **Penicillium/Aspergillus resolution problem:** These genera are lumped into a single "Pen/Asp" count in spore trap analysis, yet individual species within those genera tell very different stories — some indicate chronic water damage, others only high humidity — and they may be counted identically despite being entirely different organisms.

- **Inside/outside comparison is insufficient:** A direct indoor-outdoor spore count comparison is a significant misnomer; interpretation must be driven by on-site observations and building conditions, not a simple ratio. Dan Baxter has published on this point.
- **Not a standalone diagnostic:** Jason does not consider spore traps a diagnostic tool; rather, they are best used to investigate a hypothesis, plan remediation, and especially for post-remediation verification of air and surfaces.
- **Wall cavity samples:** Strongly advocates for in-wall cavity samples, particularly when directed by a mold detection dog — has solved numerous "medical mysteries" using this method that would have been missed by air sampling alone.
- **When air samples are appropriate:** Any time there is a health concern, water intrusion of any kind, or a high-risk population (children, immunocompromised individuals) in the building, air sampling is a reasonable baseline step — "you'd be remiss if you didn't take a snapshot of the river while you're there."
- **Context is everything:** A spore trap result is a single data point; it is not actionable in isolation. A proper report must characterize building conditions, occupant complaints, observed deficiencies, and recommended next steps — reports should be fundamentally educational.
- **Give clients what they ask for, then educate:** When clients (schools, hotels, etc.) demand air samples, the professional obligation is to provide them while clearly communicating strengths, weaknesses, and the need for contextual interpretation.

AirTrap: Design Rationale and Improvements Over Legacy Cassettes

- **Origin of the product:** Jason's Got Mold service business had a strong relationship with Zefon under previous management; after an acquisition, product inconsistencies emerged (labelling issues, confusing QR codes for consumer users), and cooperation with the vendor deteriorated despite Got Mold being a fast-growing account.
- **Partnership with Dan Baxter:** Jason and Dan Baxter — inventor of the original spore trap design — had known each other since 2003 and were both experiencing similar challenges; they decided to collaborate on a next-generation cassette, noting the patent had expired and the core geometry was proven and validated.

- **Curiosity lead to his relationships:** Poking around and asking questions lead to Jason's relationship building with the likes of Phil Morey and Harriett Ammann and then with Baxter, Peccia and Shaughnessy.
- **Design philosophy — human-centered:** Starting from a blank canvas, they asked: knowing what we know about how cassettes are used in the field and in labs, what would we build if we could start over?
- **Flip-top caps replacing adhesive tabs:** Field feedback was nearly universal that adhesive tabs get stuck in bags, get lost, or cause handling problems; AirTrap replaces them with audibly snapping flip-top caps that provide a secure, contamination-resistant closure — widely praised by users.
- **Spin-open design:** Legacy cassettes require cutting open a belly band, which has caused injuries and lab handling issues; AirTrap cassettes spin open in two seconds, eliminating that risk.
- **Compatibility:** Fits all major standard pumps without modification.
- **Environmental impact — 50% less plastic:** Approximately half the plastic of legacy cassettes was eliminated; cassettes are made from number five polypropylene (infinitely recyclable) and AirTrap has introduced a recapture program allowing high-volume labs to return used cassettes to be reprocessed into new lab supplies.
- **Flat focal plane for AI microscopy:** Advanced AI-assisted microscopy requires a flat focal plane; waviness in legacy cassette slides causes focus drift and loss of data; AirTrap worked to achieve a flatter impact gel surface, improving accuracy for AI-assisted analysis — with the caveat that cassettes stored improperly (e.g., in a hot car trunk) will still drift.
- **Lab adoption — mixed but trending positive:** Approximately 75% "wow factor" among lab techs who actually handle the product; resistance tends to come from labs concerned about upsetting a dominant supplier relationship rather than from product performance issues.
- **Adoption curve analogy:** Jason compares the adoption challenge to the early refrigerator competing against ice boxes — early adopters are enthusiastic, full penetration takes time, but the cream will rise to the top as labs encounter the product through analysis even when not purchasing it.
- **EMSL endorsement:** EMSL Analytical (an IAQ Radio sponsor) has no issues analyzing AirTrap cassettes and has provided positive feedback.

Defining "Normal" Fungal Ecology

- **The \$64,000 question:** The concept of "normal fungal ecology" has been discussed in the industry for decades but has never had a reliable tool to actually define or measure it.

- **Context-dependence:** Normal varies enormously by building type (garden shed vs. nursery school vs. industrial facility vs. residential), geographic region (Minnesota vs. Miami), and even country (Australia vs. the US).
- **Australia study underway:** Jason's team is preparing to analyze 493 samples taken across the Australian continent in collaboration with Jeremy Stamkos from RIC Solutions, with the goal of establishing baseline fungal ecology data for that region — directly comparable to US baselines.
- **Microscopic air analysis is insufficient:** It is simply not possible to define fungal ecology through microscopic analysis of air samples; too much professional judgment is required and the resolution is too low.
- **The tilted table problem:** Dr. Birgitta Anderson from Copenhagen found that nearly all commercial drywall already contains *Stachybotrys*, *Chaetomium*, and other spores in the paper itself — meaning what the industry calls "normal" fungal ecology is already skewed before any moisture event occurs.
- **Genomics as the solution:** Adequate resolution to answer the "what's normal here?" question requires genomic analysis, which provides the granularity to distinguish organisms within the same genus and detect what microscopy misses entirely.

Mold Classification Tool (MCT) and Yale License

- **License secured:** Jason's company secured the global exclusive license from Yale University to commercialize the Mold Classification Tool developed by Dr. Jordan Peccia.
- **Relationship origin:** Jason has known Dr. Richard Shaughnessy for many years; Shaughnessy helped develop the training program for 1-800-GOT-MOLD and has collaborated with Jason on research directions over time.
- **The pivotal paper:** During a call approximately two years prior to the episode, Shaughnessy told Jason he had not read a key paper — published in March 2020, when the world's attention was on COVID-19 — that almost no one had read; upon reading it, Jason described nearly falling off his chair because it aligned precisely with what he had been envisioning as the next step for the industry.
- **Why MCT is powerful for submicron particles:** Unlike spore traps, the MCT does not lose submicron particles — the very fraction that carries the highest mycotoxin concentrations and is most deeply respirable — making it a fundamentally more complete analytical approach.
- **Future vision — surface sample genomics:** Jason envisions a near-future capability where surface samples are run through a combination of

genomic analyses covering allergens, mold, and bacteria simultaneously — a single sample type yielding a comprehensive biological picture of a building's environment.

- **Validation and patience required:** These technologies require rigorous validation, and industry adoption takes time; Jason acknowledges that an industry with no meaningful innovation in 25 years cannot be expected to immediately embrace new tools.
- **Complementary, not immediately replacing:** Current tools (including spore traps) will remain complementary in the near term but will "slowly become less and less relevant" as genomic tools provide greater resolution and granularity.

Got Mold Consumer Test Kit

- **Mission:** Designed to give consumers — particularly those who cannot afford a professional inspection — access to high-quality air sampling data without scheduling appointments, obtaining permissions from landlords or employers, or navigating professional service logistics.
- **Equity motivation:** Mold problems disproportionately affect economically disadvantaged populations; Got Mold was explicitly designed to democratize access to mold data.
- **Pregnancy test analogy:** The kit functions as a cost-effective first step — like a home pregnancy test — that does not replace the professional (the "OBGYN") but helps users determine whether professional follow-up is warranted.
- **Education bundled in:** The kit is paired with educational content teaching users to engage their senses (see, smell, feel), assess their building systematically, and collect samples in areas of concern before sending them to a lab.
- **Anti-"pump jockey" motivation:** A secondary goal was to reduce the market for unqualified contractors doing unnecessary or harmful work by giving consumers better information to evaluate claims and recommendations.
- **Consumer behavior:** Customers frequently keep the pump after purchasing the kit and reorder cassettes for ongoing monitoring — indicating strong repeat engagement.
- **Service business sunset:** The 1-800-GOT-MOLD service business was wound down around COVID-19 for practical reasons (service businesses faced obvious operational challenges); the consumer product at gotmold.com continues.

- **Honest about limitations:** Got Mold actively communicates the limitations of spore traps to its customers — a deliberate choice Jason frames as an integrity issue, noting the industry has done a poor job of this historically.

Open Questions and Future Directions

- **Genomic tools for allergens and bacteria:** The combination of mold genomics with allergen and bacterial genomic analysis from surface samples represents an open research and commercialization frontier that Jason's team is actively pursuing with Dr. Shaughnessy and Dr. Peccia.
- **Global baseline data:** The Australia study will be a meaningful step toward establishing what "normal" looks like across diverse climates and building cultures, with implications for how the industry sets reference ranges.
- **AI-assisted microscopy integration:** The flat focal plane work in AirTrap is positioned to support AI microscopy tools that are emerging in the market — a convergence that could significantly improve throughput and consistency in lab analysis.
- **Industry adoption timeline:** No specific timeline was offered for when genomic tools will displace or substantially supplement current methods; Jason emphasized patience, ongoing research, and gradual refinement as the realistic path.

ROUNDUP

Pete Consigli, Global Industry Watchdog and Industry Historian

- **What about mycotoxins?:** 450 are known to science and only 12 are of medical concern.
- **Academics often talk over the heads of practitioners.** One of our operating principles is simplifying the complex, so that a smart 16 year old understands it and our explanation will standup to the scrutiny of a PhD. Dampness is the source of the disease, Moisture is the lion and mycotoxin are a single hair on the lion's tail.
- **When is enough sampling, enough?** Phil Morey gave a presentation regarding his \$250K mold sampling work at the Polk County Courthouse. Phil's response to the question: "knowing what you now, with the opportunity to do it over again what would you do differently?" he responded: Take more samples.
- **A Watchdog Question: What is your opinion and the opinions of your academic colleagues on the IICRC S520 Mold Standard?** A playbook and

framework to play from. Few issues. The standard is well received. Agree with remove and clean, the concept of normal fungal ecology, the standard is a good filter for projects S520 is not accessible to all consumers.

Note: *Brad Prezant asked that we add the following note. His presentation on June 8th 2018 at RIA Conference was titled, "What is ERMI? Does it Bite?" and it was a description of what it is, how it was developed, and the weaknesses of the method.*

Jason Earle's Final Comments:

- **AIRTRAPS Free offer** of 10 pack of AirTraps. Go to GotMold.com and type in try air trap in code box.
- Signup at Mycobiome.ai for early access to new technology. Crawl, walk, run is Jason's product development and marketing methodology.
- **What is ELISA?** ELISA is a common laboratory testing technique that detects and counts certain antibodies, antigens, proteins and hormones in bodily fluid samples. ELISA testing is specific, limited and costly. Jason foresees MCT.
- **The Advanced Research Projects Agency for Health (ARPA-H)** supports transformative research ranging in scale from molecular to societal to deliver health breakthroughs in years, not decades. Dr. Peccia has received a research grant which may result in expanding product capabilities.

Z-Man signing off

TRIVIA

Question: Name the important us agency founded 68 years and 2 months ago from today?

Answer: NASA

Answered by: Don Weekes, Ottawa, Canada