BIO-COMPUTE

The Computer You Grow

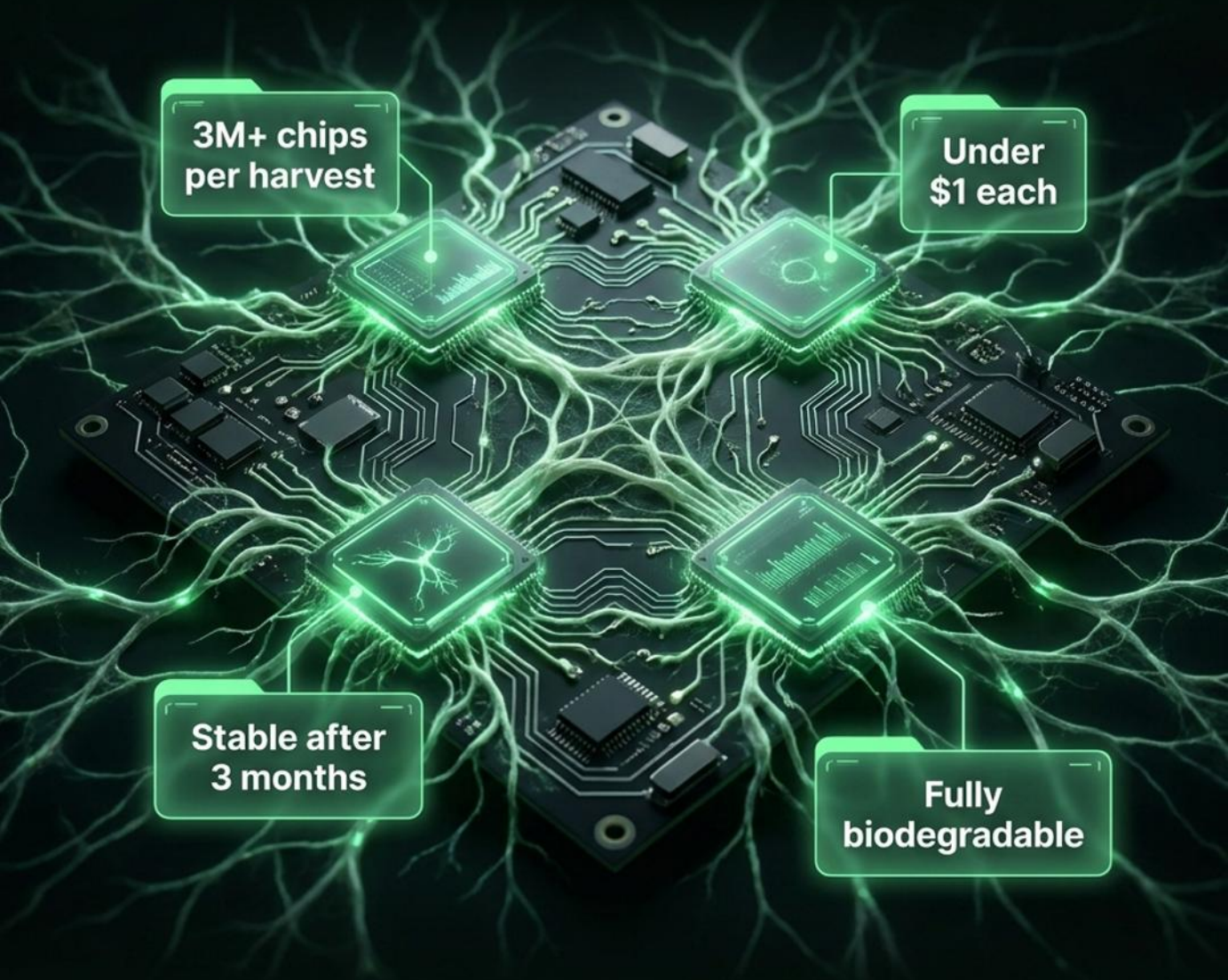
We spent 50 years shrinking silicon.
Now we are growing chips out of mushrooms.

imiel.dev

Swipe →

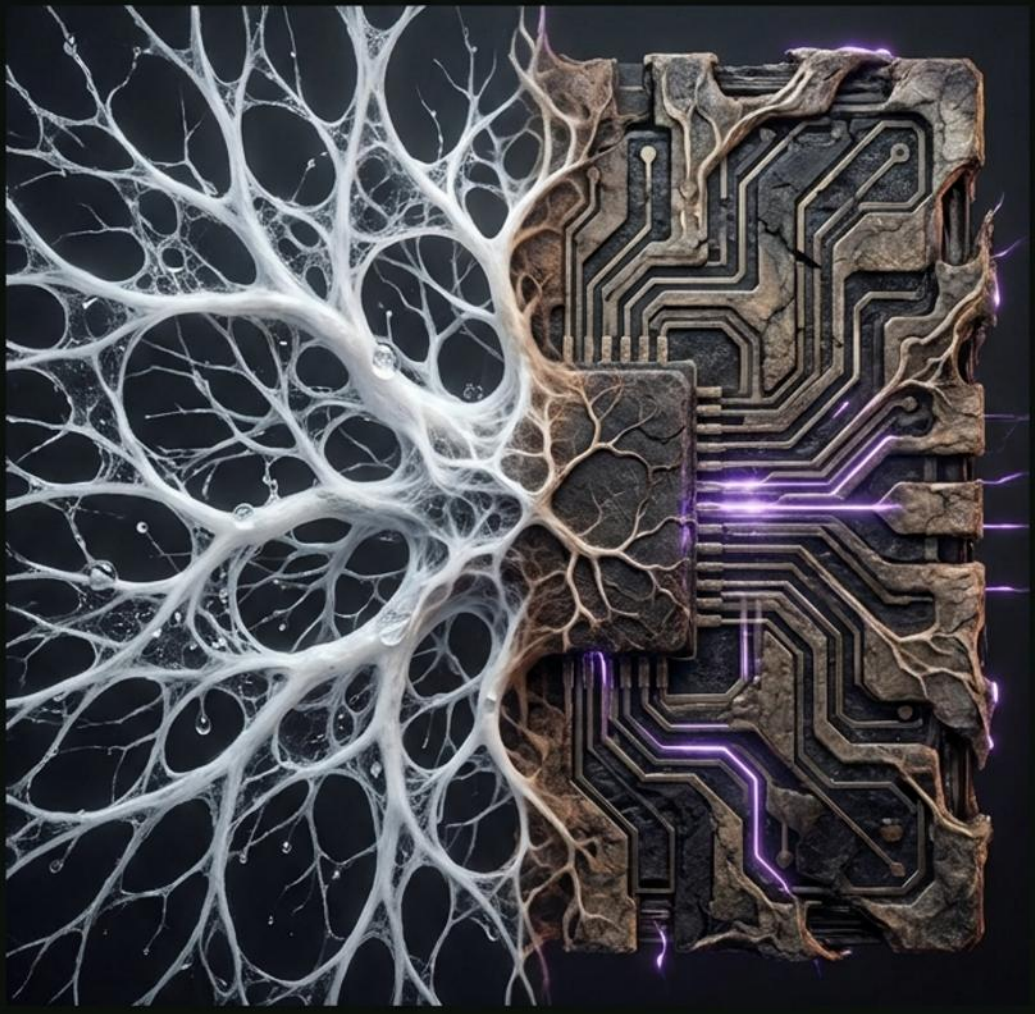
Design. Grow. Compute.

June 2026, Scientific Reports. A team from Ecovative published a working analog AI chip you you do not fabricate. You farm it.



It Is Not a Living Mushroom Thinking

The chip is dead. They grow fungal mycelium into a structure, dry it, then wick a conductive polymer (PEDOT:PSS) into the tissue. The mushroom is the scaffold. The computation rides on it.



The structure is the software.

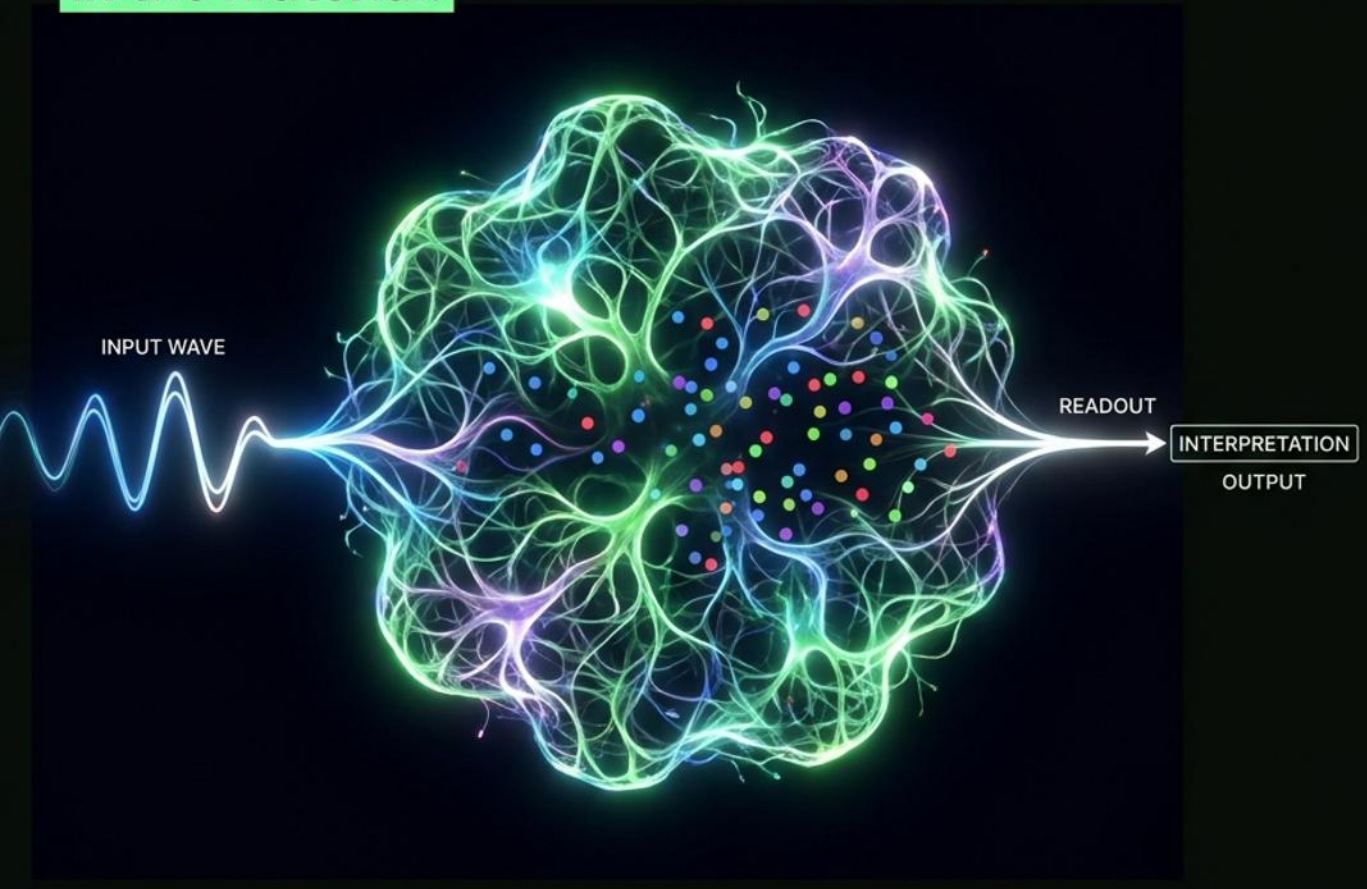
You do not program it with code. You program it by changing how the mushroom grows.

How a Mushroom Computes

It is called reservoir computing. Pour a signal into any complex nonlinear material with a little memory. Its messy physics smears the input across a high-dimensional space.

Then you train just ONE readout layer to interpret it.

The hard nonlinear work is done for free, in the material.



Why Anyone Cares: Energy

~20 W

the human brain does exaflop-scale work on about twenty watts

~1,000,000x

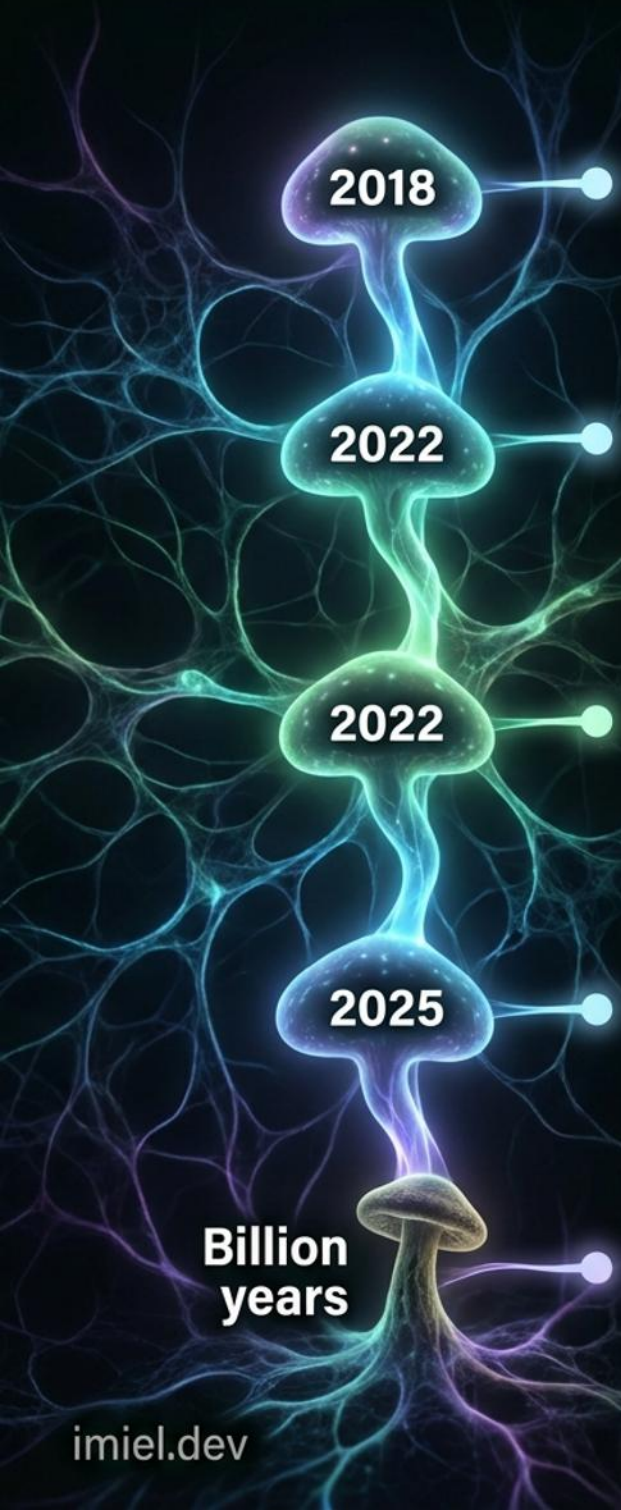
more efficient than today's AI hardware

1,000+ TWh

projected global data-center electricity in 2026. Power, not chips, is the constraint.

Computing in matter avoids the digital tax. One analog reservoir used ~100x less energy than a GPU.

This Has Deep Roots



Adamatzky, **Towards a Fungal Computer** (Bristol)

The **Language of Fungi**: spikes cluster into a ~50-word vocabulary

FUNGAR: a 2.5M pound EU project to grow computing buildings

Ohio State: **shiitake memristors** switching ~5,900 times a second

Slime mold solves mazes in a single pass

Will It Run Your Models? No.

The limits are real and the field admits them.

Living fungal signals crawl: about 30 minutes to travel one meter.

This is one prototype, on one benchmark.

The best fungal memristors are still slower than the worst silicon ones.

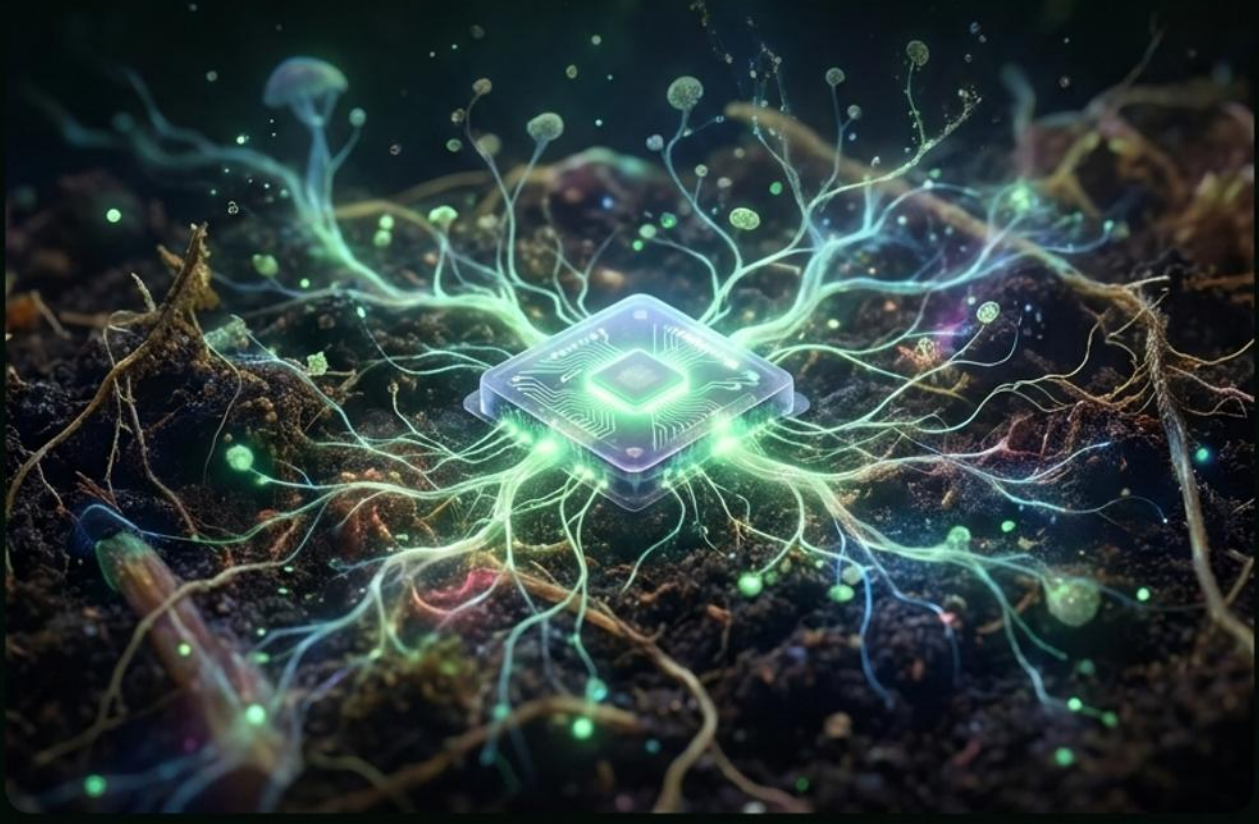
The authors concede it plainly: performance traded for sustainability.

So What Is It Actually For

Not the data center. The realistic near future is humble and a little beautiful: ultra-cheap, compostable, mass-grown analog sensors and inference at the edge.

A computer you bury in a field to listen to the soil, then let rot.

Three million at a time. Under a dollar each.
Programmed by how they grew.



The Substrate Is Up for Grabs

For 50 years we bent nature into silicon and paid in heat and power. Two opposite escapes are now real at once.

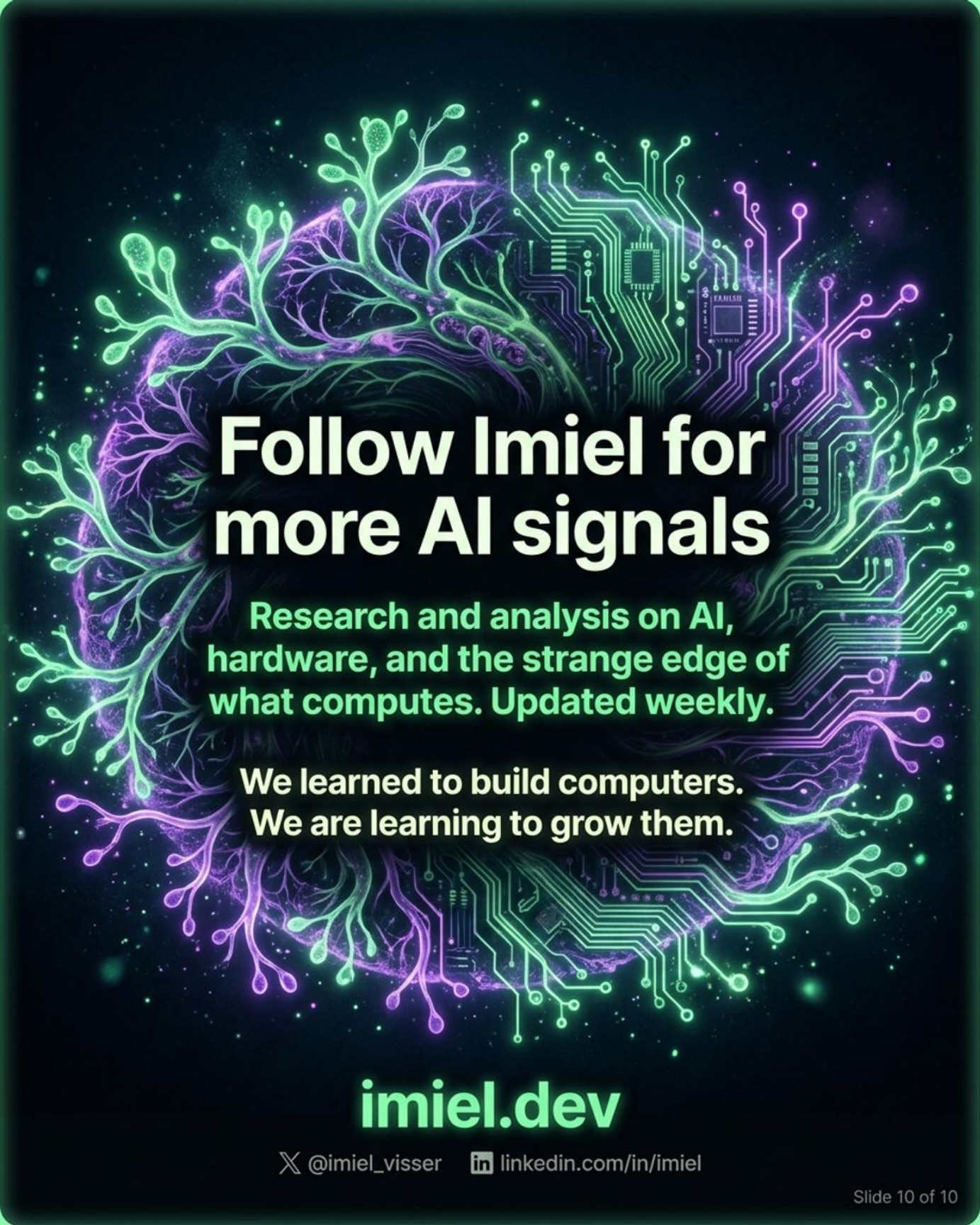
DIAMOND

wrap silicon in the best heat conductor on Earth

MYCELIUM

grow the computer out of a mushroom

Silicon, for the first time in a long time, is just one option among several.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