

PaPaLaB

— Our Origin Story



A Challenge at the University of London Sparked an Awakening to Color

To deliver reliable diagnoses even from faraway places—this was the aspiration entrusted to PaPaLaB founder Makoto Kato’s joint research with the University of London: **an experimental trial of remote pathology diagnosis using a satellite link.**

It envisioned a future in which accurate pathological diagnoses could be made by viewing microscope images even when a physician was not physically present. To make that future a reality, the project was driven by advanced technology and a strong sense of mission. But an unexpected barrier emerged.

—With an **RGB** color camera, it was impossible to reproduce the subtle “differences in color” that pathologists need —

In pathology, slight differences in color can sometimes lead to life-or-death judgments. Yet because of the limitations of RGB, colors viewed on a screen can appear different from what is seen in reality.

Late one night, as he grappled with this issue, Kato happened to turn on a BBC program in his London hotel room—and heard a sweeping evolutionary account: that during the age of dinosaurs, early mammals’ color vision regressed, and that later, through mutation, monkeys and humans re-acquired a “third color-vision band.”

A Late-Night BBC Program Told a Story of How Color Vision Evolved

The evolution of color vision speaks to how living beings have expanded the world they can “see.”

It was the moment a powerful fascination with the theme of color took hold in Kato.

“Could We Build a Camera That Sees Like the Human Eye?”

After returning to Japan, carrying that experience with him, Kato held repeated discussions with Professor Shimodaira at Shizuoka University on the topics of “human color vision” and “color reproduction.”

Initially, they attempted to prototype a **four-band camera** based on the XYZ color-matching functions. However, the plan was shelved due to the difficulty of precisely aligning the optical filters. “This filter is extraordinarily close to human vision.”

Kato was convinced. A camera that faithfully reproduces the characteristics of human vision might finally be within reach.

The turning point came when Professor Shimodaira introduced a **uniquely designed three-band filter**.

The moment Kato saw its characteristic curves, he was reminded of what he had heard on the BBC program—humankind’s acquisition of “three-band” color vision.

At the Intersection of Color-Vision Evolution and Optical Design

This three-band filter was developed through a reanalysis of the XYZ color-matching functions and incorporates an axis design that minimizes overlap between bands to the greatest extent possible.

It embodies a rational design philosophy—distinct from biological evolution—focused on maximizing measurement accuracy.

“It is almost like a dialogue between science and biological evolution,” Kato said, continuing his discussions with Professor Shimodaira as he grew increasingly impressed by the depth of color and its integration with technology. These conversations would later become the starting point for the development of the “**color-faithful camera**” and the “**two-dimensional colorimeter**.”

Beginning with the challenge of telemedicine, Kato’s journey—awakened to the theme of “color”—continues to this day.

Our Early Products



Remote Pathology
Diagnosis System

YC-140



2D Colorimeter
(Still Images)

YC-1500



2D Colorimeter
(Video)

YC-900

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