Quid Deinde?


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For centuries, yoga and prāṇāyāma have been celebrated as timeless practices of self-regulation, balance, and inner clarity. Ancient texts like the Yoga Sūtras and the Haṭha Yoga Pradīpikā describe not only their spiritual dimensions but also their profound effects on body and mind.

Yet, in the modern scientific landscape, these practices are often explored in fragments—measured in heart rates, brain waves, or stress markers—without fully capturing the depth of their mechanisms. As we inherit this wisdom in an age of data and computation, the question arises: how do we translate age-old practices into models that speak the language of science? It is here that Heritage Science and Technology finds its most compelling challenge—and opportunity.

Much of today's research on yoga and meditation tends to focus on practices such as prāṇāyāma—anuloma-viloma, nāḍi-śodhana, śītalī, brahmari, śāmbhavī. These studies catalog outcomes such as heart rate changes, subjective well-being, or EEG shifts. Yet the deeper question—how exactly do these practices work?—often remains unanswered. Without causal understanding, the knowledge risks staying anecdotal rather than clinically actionable.

Mechanism matters. Consider clinicians who rely on breathing techniques in post-operative care and rehabilitation. Or think of Lamaze training in childbirth—essentially yoga-based breathing and posture practices, yet rebranded because the original tradition was not documented in formats recognizable to modern science. The absence of mechanistic studies, large cohort research, and causal models makes yoga seem less rigorous, when in fact it carries centuries of refinement. The research ecosystem perceives this work as high-risk and low-reward, yet it is precisely where transformation lies.

Modeling can offer that bridge. Mechanisms in yoga are not always directly observable; they must often be inferred through multimodal computational approaches—physiology, imaging, sensor outputs, and even textual annotations. Artificial Intelligence can integrate such data to define plausible mechanisms across scales. This could provide the missing causal layer that connects breathing techniques to neural or cardiovascular changes. As the Bhagavad Gītā reminds us, "yogaḥ karmasu kauśalam"—yoga is skill in action. Mechanistic clarity would make this skill prescribable.

Science offers parallels. Alexander Fleming discovered penicillin, but only when its biochemical mechanism was later unraveled could antibiotics be systematically prescribed (Lobanovska & Pilla, 2017).

Dr. Tu Youyou's work on Artemisia annua is another example: by isolating artemisinin and documenting the extraction method, a traditional remedy became a global antimalarial (Nobel Prize, 2015). Mechanistic understanding transforms tradition into therapy.

Yoga research could follow suit. Imagine prāṇāyāma prescribed not vaguely as "ten minutes daily," but calibrated by age, weight, comorbidities, and recovery needs—much like drug dosage. Ayurveda echoes this: efficacy depends not only on the active principle, but also on grounding, extraction, and method of administration. Yoga Sūtra I.2 reminds us, "yogaś citta-vṛtti-nirodhaḥ"—yoga is the stilling of mental fluctuations. To reach this reliably in clinical settings, reproducible parameters matter.

Looking ahead, the future of Heritage Science in yoga technology lies in developing causal mechanical models. These would benchmark traditional practices with the rigor of biomedical sciences, integrate AI-driven multimodal computation, and validate through clinical studies. When this happens, yoga will no longer be framed as an "alternative," but as a precise and evidence-based science of body–mind interaction.

So, quid deinde? The way forward is to ask not only what yoga does, but how yoga does what it does. Only then will heritage knowledge reclaim its rightful place in science and technology.

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