Review Paper _The Urbanism of Metabolism by Raffaele Pernice

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The Urbanism of Metabolism, edited by Raffaele Pernice, introduces Kiyonori Kikutake's definition of Metabolism as a reflective philosophy, concerned with 'the chemical processes that occur within a living organism in order to maintain life.' Originating in Japan, Metabolism developed as an architectural movement, exerting significant influence between the late 1950's until the early 1970's.

Operating form within the belief of non-static entities, both Metabolist's architectural and design fraternity held to the view that cities and buildings are organic and ever-changing (Creaven, 2019). Considering structures that had to accommodate postwar population growth and thought to have limited lifespan, Metabolists advocated a more durable spine-like infrastructure, interlined with prefabricated, replaceable cell-like parts, easily attached and readily removable at the end of their functional life-cycle.

Concurrently, across the Pacific Christopher Alexander's 1960's philosophy postulated an organic like structure and architectural hierarchy involving periodic and temporal growth patterns. Alexander argued that no individual act of building should be considered in isolation, but rather an emergent product of synthesis.

With rising 'spatial' urgencies, driven by climate change and a myriad of environmental risks, urban designers and architects have sought sustainable approaches for contemporary urban development. Such renewed interest in the 'organic' simultaneously revived the relevance of Metabolism's life-maintaining roots. Added to this, the metabolic system's capability to respond to risk situations and environmental uncertainty through combinations of adaptability and risk features are what distinguishes Metabolism as a relevant concept as well as an operational philosophy.

Raffaele Pernice's editorial notes states 'Metabolism's aims in the urban and architectural framework; 'to design flexible urban spaces and replaceable architectural elements inspired by the key themes of cycles of uses, nomadism, .. and recycling'(p8). The chapters that follow deliver thematic interpretations related to 'sustainable forms of large-scale urbanization and habitat design in the twenty-first century.' Hajime Yatsuka addresses the needs of contemporary cities in this new millennium haunted by unprecedented global challenges and the continuous alteration of natural habitats with the destruction of entire ecosystems. Botond Bognar highlights how a reorientation of the Metabolist vision points to other flexibilities, noting how such flexibility opens the capacity for regeneration, adaptive reuse or the recycling of materials, structures and renewable energy sources. In chapter three, Pernice argues how new technological knowledge trigger different and sometimes radical urban forms. In Chapter four and five, Peter Šenk and Jon Lang define Metabolism as a flowing pattern that evolves the quality of buildings and, in turn cities, via anthropogenic activities. This evolving form of space and all built form should be considered as adaptive

environments that are each responsive to environmental, social, and cultural influences.

In reconsidering the applicability of the Metabolists approach from a contemporary perspective, both chapter eight - Ken Tadashi Oshima - and chapter eleven - Yasutaka Tsuji - discuss the interpretation of building scaffolding and cities as a subset of a broader typological agglomeration, in itself considered as a living creature. Both authors argue how the value and the role of metabolism can perpetuate new urban paradigms and architectural imaginaries as flexible living creatures and systems.

Chapters twelve and thirteen - Yuriko Furuhata and Julian Worrall – critique the alignment of old and new challenges in the metabolic framework, between the built environment's conventional obstacles (pollution and rising sea levels), the continued alignment to normative narratives in relation to new and radically different challenges presented by the global crisis brought on by COVID-19; 'While the Metabolists sought to offer an alternative conception of urban processes based on biological rather machinic metaphors, the unfolding of the movement extended rather than overturned modernity's grand narrative of historical progress based on purposive technocratic rationality' (p192).

The Urbanism of Metabolism provides important insight into the development and implementation of sustainable development strategies, highlighting the significance of a city's adaptation capabilities to address complex and uncertain risks associated with the environment and public health. There is a necessary emphasis on urban, territorial structures and wider infrastructures, where energy, materials and information are consumed and accumulated and they transit, on the behaviours of inhabitants and spatial communities. Such territories must be able to intercept local and global flows, able to interact by adapting to systems and spatial dynamics.