The Beginning of a Green Architecture: Otto Koenigsberger at the Department of Tropical Architecture at the Architectural Association (AA) School of Architecture, London, UK

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In a brief history of green design, Brian Edwards claims that: "*As a general statement, the spiritual approach to 'green design' is found in the underdeveloped world and the low energy, high material approach in the developed.*" [1]

In 1973, the rational technology unit at the Architectural Association (AA) School of Architecture was constituted in response to the energy crisis precipitated by the Middle Eastern Yom Kippur war. This unit claimed that a significant shift in the western architectural paradigm had taken place which resulted in the end of the "current technocratic, highly wasteful and energy intensive society".[2] By 1976, the first wave of environmentalism had impacted "western" architectural discourse. In the 1980's and 1990's, the second wave of environmentalism resulted in the paradigmatic redefinition of development to include sustainability, which consequently generated Green Architecture.[3] Sustainability is politically subversive,[4] and in conflict with the interests of global capitalism.

This paper problematizes Edwards' assumption that there exists an impenetrable boundary between the "developed" and "underdeveloped" world in the evolution of Green Architecture. It is agued here that Tropical Architecture was the ideological precursor to Green Architecture. This paper presents the story of the global circulation of Tropical Architecture as the antecedent to Green Architecture, by following the career trajectory of the émigré architect Otto Koenigsberger (1909–99) (Fig.1) and his contribution to the Department of Tropical Architecture (1954-1971) at the AA School of Architecture, London, UK. Green architecture is incongruent with the interests of capitalism, and yet, existing histories of architecture inextricably link Tropical Architecture with 1950's neo-colonial advancement of global capitalism.

Fig. 1 Otto Koenigsberger in India 1940's (source: Otto Koenigsberger's Private Papers, with permission of Dr. Renate Koenigsberger)

As a colonial construct, the term Tropical Architecture was first used in a RIBA paper presentation in 1869.[5] In the late 19th and early 20th century Tropical Architecture developed as a body-centric discourse, which was circulated through colonial hygiene

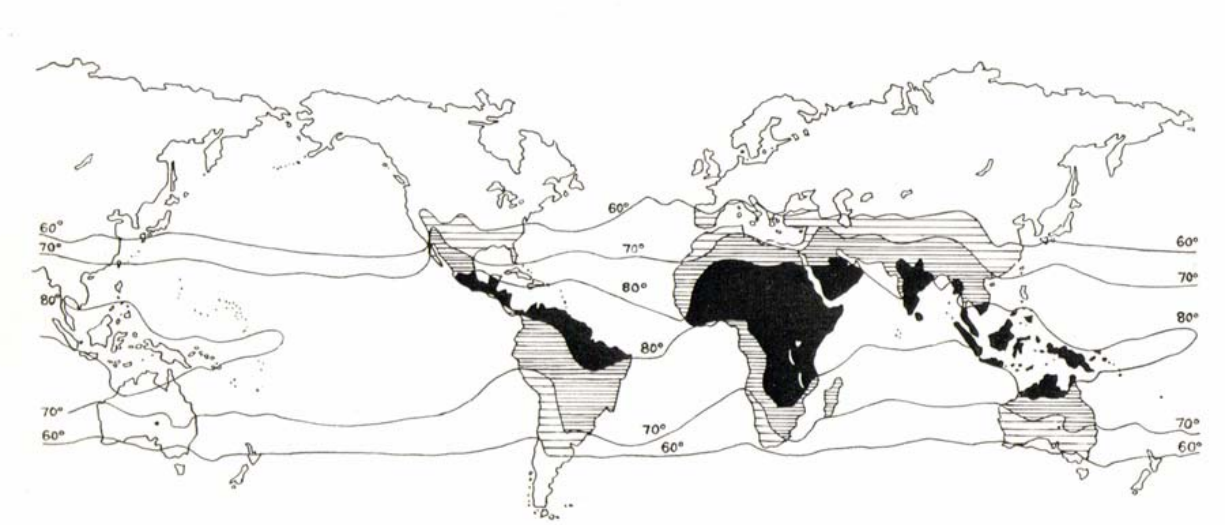

Fig. 2 The Tropics mapped in terms of temperature belts (source Fry, Maxwell, and Jane Drew. *Tropical Architecture in the Dry and Humid Zones* New York: Reinhold Publishing Corporation 1964. p-32)

manuals. The paramount concern of the tropical hygiene manuals was the physical well being of the human body in the tropics. These manuals prescribed material and spatial practices to achieve ventilation, natural lighting, sewage disposal, water supply, sanitation, and construction as preventive techniques to check the spread of diseases.[6] The publications of 1950's,[7] suggest that Tropical Architecture was geo-climatically defined as "an architecture suited for the tropics", which included vernacular, colonial, and recent modern architecture in the tropics.

By the 1950's the conception of tropics and tropical architecture was transformed. The tropics, which were a combination of existing British or former colonies, were reconstructed as a geopolitical zone of desire, colonial anxiety, and underdevelopment.[8] The relationship between Britain and the tropics was being reimagined. With rise of anti-colonial movements in the tropics and the ideological association between colonial architecture and the sovereignty of the British Empire, British modernists perceived a huge market for modern architecture in the developmental aspirations of the nationalizing tropics.[9] Tropical Architecture migrated from its origin in field of hygiene to its natural disciplinary home, that is, architecture, and was reframed as climate responsive architecture.

For the purposes of Tropical Architecture, Koenigsberger defined the tropics as "*Countries where winter never comes and with temperatures above an annual average of 69 F – irrespective whether they are hot and dry or warm and humid – produces cycles of living and conceptions of home and shelter which are fundamentally different from those of northern regions."*[10] For British architects the climatic, economic, technological, differences between the tropics and the metropole were all subsumed under the heading of "climate".[11]

In proposing that Tropical Architecture is the precursor to Green architecture, this paper notes two principle differences between the architecture prescribed in the colonial hygiene manuals and the Tropical Architecture of the 1950's. One, in the 1950's the level of scientific and mathematical application had reached an unprecedented level of sophistication through the collection of meteorological data and its correlative application in architectural design. Two, the emphasis shifted from disease prevention in the hygiene manuals to physiological comfort in buildings in the 1950's with minimum reliance on energy consumption. This paper stresses that these two developments were to establish Tropical Architecture as the ideological precursor to Green Architecture. Even though these discourses are conceptualized inversely: the latter claims to protect the environment from the body as a voracious consumer of natural resources, and the former, to protect the body from the environment, these discourses serve the same function. In the mid-20th century, architects in

Europe and America relied heavily on mechanically conditioned buildings due to the cheap cost of energy from the abundance of "tropical oil" from the Middle East. At that moment in history, tropical architects in London and the tropics, were vanguards of an energy-conscious, climate responsive Tropical Architecture.

Anthony King frames Tropical Architecture as a case of post-1947 in the case of Asia, and post-1956 in the case of Africa, "cultural colonialism", an export of "modified" Euro-centric modern architecture and planning, from the metropole to the colony.[12] Post-colonialists such as Uduku, Le Roux, and Crinson, frame Tropical Architecture in relationship to the political order at the end of the empire. Uduku proposes Tropical Architecture was the precursor to globalization.[13] Le Roux frames Tropical Architecture as a "network at the intersection of the circuits of modernism and the British Empire."[14] Crinson views Tropical Architecture in an intermediate space between colonialism and globalization.[15] These accounts are problematic on there counts: one, they dwell on the work of British architects in the tropics, reinforcing the colony-metropole power structure. Two, this scholarship assumes that British architectural culture is impenetrable to the discursive impact of the tropics. Three, the symbiotic relationship between neo-colonial capitalism and Tropical Architecture forms the unquestioned basis of this body of scholarship.

In departing from the approaches listed above to locate Tropical Architecture in the "western" world as the precursor to Green Architecture, this paper benefits from the discursive field opened up by investigations of the impact of imperialism on domestic British culture.[16] This paper acknowledges the insights gained from architectural scholarship, which looks at the constitutive role of colonies in the formation of metropolitan architectural cultures.[17] This paper contributes to the field of scholarship, engaged in asserting the role of "non-western" discourses on the development of the "western" discourse of sustainability.[18]

Koenigsberger's career is a testament to the complex economy of the tropics and London within which the discourse of Tropical Architecture was generated and circulated. Koenigsberger was an émigré architect who escaped Nazi Berlin to arrive in India in 1939. He subsequently emigrated to London in 1951, after having served as a planner (1948-51) in Nehru's government and as the chief architect (1939-1948) in princely Mysore. His architectural experience in India enabled him to develop his definitive body of knowledge on Tropical Architecture.[19]

In following the career trajectory of Koenigsberger, this paper problematizes the relationship between neo-colonialism and Tropical Architecture on three counts. One, the location of London as the origin of tropical architectural knowledge is decentered by tracing the genealogy of the AA curriculum to Princely Mysore in India. Two, the idea that architectural knowledge flowed unilaterally from London to the tropics is problematized by asserting that the discourse of Tropical architecture formed the ideological foundation of the global discourse of Green Architecture. Three, it is established that the climate-conscious architecture is associated with conflicting political aspirations.

An Architecture for the Tropics at the AA in the 1950's

In 1953 the AA School invited Otto Koenigsberger, George Atkinson[20], and Leo De Syllas[21] to form an advisory committee to prepare a detailed program for study for the department of Tropical Architecture.[22] The Department of Tropical Architecture at the AA was the first of its kind in the world.[23] The department was set up at the AA in 1954, following the 1953 conference on Tropical Architecture at the University College London.[24] Maxwell Fry, who was reputed for his work in West Africa and India, was made in charge of the Department.

The Tropical curriculum at the AA included climatology, climatic design, indigenous architectures, hygiene, and building services.[25] The Tropical program began as a six-month course open to final year AA students and as post-graduate specialization for architects.[26] In 1961, the department changed its name to the Department of Tropical Studies to acknowledge its inclusiveness of tropical urban studies and development. In 1965 the architectural research conducted by the department was implemented, through the establishment of the Tropical Advisory Service, a consultancy service for architects and government departments. In 1971, due to financial reasons the Department of Tropical Studies moved its

home from the AA to the University College London, and under the directorship of Koenigsberger became the Development Planning Unit. Tropical Architecture did not lose its relevance with the closure of the department at the AA. The ideology of Tropical Architecture as an architecture based on climatic design, minimal reliance on energy, and responsiveness to local conditions resurfaced in "western" architectural discourse as Green Architecture after the energy crises of the 1970's.

From 1939-1948, Koenigsberger developed the foundational ideas of Tropical Architecture while in service of a *swadeshi* princely regime, in Mysore under indirect British rule in India. *Swadeshi* (indigenously produced) was deployed as an ideological strategy of non-violent resistance to claim freedom from the Raj. Koenigsberger's *swadeshi* modern architecture signified resistance against the Raj.[27] Ironically, the same architectural ideology in London was linked with the imperial advancement of global capitalism.[28] Green Architecture in the "west" is associated with leftist political ideology through its resistance to excessive consumption, and hence capitalism.

Koenigsberger and the Development of the Tropical Curriculum in India

In order to trace the genealogy of the AA Tropical curriculum to princely Mysore, this paper investigates Koenigsberger's career before he arrived in London. He was trained as an architect at the Technical University of Berlin under the tutelage of Hans Poelzig. He worked briefly with Ernst May and won the Schinkel prize in 1933 for a design of the forthcoming 1936 Olympics in Berlin. In 1933, with the rise of the National Socialist party's anti-Semitism, Koenigsberger was dismissed from service by Hitler's government. He proceeded to Egypt to work as an archeologist and completed his doctoral thesis on the construction of the ancient Egyptian door, which was accepted in Berlin in 1935.

Otto Koenigsberger emigrated to India in 1939 at the invitation of Sir Mirza Ismail, the Prime Minister of princely Mysore, to become the chief architect of the Public Works Department (PWD). In 1948, Koenigsberger was appointed the director of the Federal Housing Program for Nehru's government in New Delhi, to provide housing for the partition refugees. He became an Indian citizen in 1950. He proposed a pre-fabricated housing module, which did not succeed, consequently, he resigned from his post and came to England in 1951. While in India, he met Jane Drew and Maxwell Fry. They collaborated to set up the department of Tropical Architecture at the AA in 1954. Along with teaching at the AA, Koenigsberger worked with Charles Abrams as a UN consultant on housing missions to third world cities.

As the chief architect of the Mysore PWD, Koenigsberger worked in collaboration with Indian engineers and the construction industry. He designed several state institutions to advance the development program of the princely regime. His Mysore oeuvre comprised of schools, hospitals, government offices, housing, and higher education institutions. The evolution of his work in India demonstrates the indigenization of his architecture and the development of a regionalist architecture, which coincided ideologically with the Mysore *swadeshi* strategy. The *swadeshi* policy of the government restricted the use of imported building materials in construction. The *swadeshi* constraint to use local materials and construction technologies combined with cost constraints on mechanical conditioning of buildings impelled him to develop an architecture, which responded to these requirements.

In 1939, Koenigsberger designed the Broadcasting Studios in Mysore. He arrived at the architectural form based on the best response to the program, which he defined in terms of function, climate, and acoustics.[29] In his later projects, for example, the Sri Jayachmarajendra Institute of Indian Medicine (1948), Koenigsberger mastered the use of architectural elements such as shading devices, courtyards, and lattices, which were used for climatic control. (Fig.3) At this point he used these elements intuitively rather than using precise mathematical calculations.[30] He experimented with the formal possibilities of a climate responsive architecture.[31]

As an educator in Bangalore in India, Koenigsberger questioned the redundancy of colonial taxonomies of Ferguson's[32] architectural history: "*Ferguson's book was written about 100 years ago, in 1840, Banister Fletcher's was first published in 1896. Ferguson merits as a teacher of Architecture in*

general …It is wrong to teach them (students) anything about Dravidian, Chalukayan, and Indo-Aryan style. These are names and classifications invented by Ferguson for the first and preliminary classification of Indian Architecture. They were useful for the beginning but they have been given up now-a-days as not in keeping with the facts and as not sufficiently systematic because they mix up geographical, historical, philogical, and architectural principles of classification."[33]

Fig. 3 A courtyard in the Sri Jayachmarajendra Institute of Indian Medicine (Ayurvedic Hospital) Bangalore, Karnataka, formerly Princely Mysore (Source: photo by the author, Bangalore, Dec. 2005)

Koenigsberger, therefore, called for a modern interpretation of recent Indian architecture. As the chief architect of a modern Mysore PWD, where innovation and experimentation were the norm, he realized how architecture in princely Mysore in the past hundred years had changed. He called for an ethnographic analysis of buildings in Mysore to document their construction techniques and functionality. This would constitute the modern training of architects.[34]

In India, Koenigsberger drew three important conclusions about local architectures: one, these were a rich repository of cumulative knowledge; two, the indigenous architecture had undergone a revolution in the late 19th and early 20th century; and three, colonial taxonomies of canonical Indian architecture were obsolete for a student of architecture in modern India. With Koenigsberger's emigration, these ideas traveled to London from India. I conclude that Tropical Architecture as a discourse did not originate in London and then get transposed to the tropics, but the reverse happened.

Architecture for Export?

Despite the fact that the tropical department comprised of architects who had spent significant time in the tropics and practiced more in the tropics than in England, the British architects at the AA saw themselves as "exporting" modern architectural expertise.[35] They proposed that the "export" of architectural knowledge would reinforce the relationship between the former colonies and the metropole in an imperial continuum.[36] The objectives of the Tropical department were to train British and ex-colonial architects to work in the tropics, and to develop the AA as an institutionalized repository of knowledge and research on Tropical Architecture.[37] In the 1953 conference on Tropical Architecture, British architects at the AA debated the ideological approach to the problem of building in the tropics. They argued whether British architects should British "export" modern architecture to the tropics or educate themselves on local architectures to modernize local architectures.[38] British architects not only saw the tropics as a market for themselves, but also as a market for British construction and engineering industry. They agreed that indigenous crafts might be useful in embellishment, but mechanical and technical building components had to be imported from Britain.[39] Indeed these policies reflected in the work of the AA Tropical Department students, who proposed a combination of local and imported materials in their hypothetical studio assignments. Tropical Architecture was intended to be a commodity in the global circulation of capital[40] and yet, it ended up being domesticated at the Rational Technology Unit at AA as energy-conscious architecture.

Although the Tropical Department closed at the AA in 1971 and moved to University College London as the Development Planning Unit, the ideology of a low energy, climate responsive architecture did not diminish with the empire. The same ideology found its new intellectual home in the rational technology unit at the AA constituted in 1973, in response to the energy crises.[41] The unit conducted research on alternative forms of energy and on architectural techniques for lowering energy consumption in buildings. Its research was published as a collection of essays and the

bibliography included UN seminars proceedings held in India in the 1950's. In the process of "exporting" architectural knowledge overseas, British architects unwittingly established themselves as vanguards of environmental architecture, which returned to the AA in 1973 as mainstream *revolutionary*[42] architecture. The tropics were not just "out there" but the within the AA, in the heart of the former empire.

Tropical Architecture: The Beginning of a Green Architecture

The development of the department of Tropical Architecture department constituted two significant changes at the AA. The first was a rise in anthropological interest in the climatic wisdom of vernacular architecture. This also formed an important component of Koenigsberger's unpublished book manuscript on Tropical Architecture[43] and several AA journal publications.[44] The second change was the development of a body of knowledge on climatic design, which was comprised of a hyper-scientific and mathematical approach to determine architectural form using meteorological and local site data. This constituted the foundation for the Green Architecture. The objective of Tropical Architecture, as defined by Koenigsberger, was to create a "naturally conditioned" building, which has a planned thermal response without the use of mechanical conditioning methods, but it is not an unconditioned building".[45] What he termed as naturally conditioned then, was later reconfigured as passive technology.

Critics of climatic determinism at the AA, such as Peter and Alison Smithson questioned the reductiveness of the climatic design approach:

> "*It is no good looking to the climate and the physical environment to give the form of the building. Technically, a glass box and a mass-concrete cave can produce the same comfort conditions, if one can afford the right mechanical equipment. It all depends what you are after. The shape of the culture can only be built up by separate individual form-giving decisions towards a common ideal – however vague this ideal may seem at the present*." [46]

The Smithsons' critique reflected the dominant mid-century position of European and American modernists who felt liberated by climatic constraints through mechanically conditioned buildings. In the 1950's with lowered energy costs due to "tropical oil", the interest in developing low energy buildings in the West declined in the absence of a market for these design technologies.[47] European and American architects were busy experimenting with the formal expression of mechanical services, which ranged from invisibility, as in the pure glass box, to Kahn's formal experiments with servant and served spaces.[48] At this point in history, tropical architects in London and the tropics were acutely aware of the prohibitive costs of mechanically conditioning. In response, they developed Tropical Architecture as body of knowledge, which comprised of design techniques to minimize energy consumption.

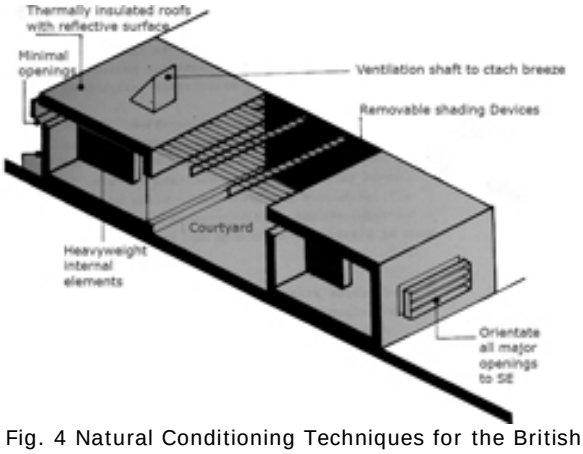

Fig. 4 Natural Conditioning Techniques for the British High Commission (source: Tropical Advisory Service. "British High Commission, Islamabad: Climatic Design Report." in the Otto Koenigsberger's Private Papers, with permission of Dr. Renate Koenigsberger)

Tropical architects appropriated the principles of natural conditioning from the diverse repertoire of various vernacular and colonial architectures in the tropics. They reconstituted these principles scientifically and mathematically through a modernist paradigm to form Tropical Architecture, which was circulated through numerous conferences, publications, and the AA department. In the process they laid down the ideological foundation for the field environmental design in the "western" architectural discourse.

As early as the 1960's, Koenigsberger had started using the term "climate consciousness", a design paradigm predicated upon strategies to minimize energy consumption in buildings through decreasing the penetration of unwanted environmental elements and increasing exposure to desirable climatic features.[49] "Climate conscious" later appeared as "energy conscious" in the "western" discourse of sustainability. An energy conscious design primer for European architecture published in 1992, almost thirty years after Koenigsberger used the term "climate conscious", resonated his Tropical paradigm in its opening statement: *"To make a building is to create a system linked to its surrounding environment, and subject to a range of interactions affected by the seasonal and daily changes in climate."*[50]

Over the course of the 50's and 60's the AA Tropical department prescribed several techniques to achieve the objective of reduced energy consumption in buildings. In one of the early publications, Atkinson recommended design techniques such as shading, passively induced wind movements, and thermal insulation.[51] Koenigsberger's ideas, developed in India and London, and culminated in *the Manual of Tropical Housing and Architecture*, which prescribed techniques to determine architectural form to achieve physiological comfort, with or without using mechanical conditioning. [52]

Koenigsberger listed a series of design strategies (Fig.4) through which reliance on energy could be minimized, which included: building orientation, appropriate building materials, external surface treatments, control of solar penetration, induced external air movement, the size and design of external openings, and the building's connection with the ground.[53] These design techniques had been used in prior architectures of the tropics. What was novel by the 1960's was that tropical architects had developed precise mathematical processes of quantifying and calculating design variables based on meteorological and environmental data.

Tropical students used geographical data such as latitude, longitude, altitude, and continentality, and meteorological data such as annual range of temperature, daily range of temperature, rainfall pattern, and wind movements[54] to calculate wall thickness, window openings, ventilation methods and other architectural features. The presentations of the tropical students were distinguished from students' work in other departments by their juxtaposition of design solutions with visual representations of meteorological data, in the form of solar path diagrams, wind flow diagrams, and rainfall charts to rationalize architectural form. The Tropical department showcased the student work of Harris Sobin, which was emblematic of the "form follows climate" rhetoric of Tropical department. Sobin designed three museums in three different climates: in London, Khartoum, and Port Harcourt, with three different corresponding architectural solutions. The objective of the studio project assigned to the students was to highlight the relationship between architectural form and climate. The students were given a design problem where they had to pay equal attention to the conflicting demands of thermal comfort and natural lighting. Sobin treated lighting and ventilation as functions and proposed a horizontal division of these functions: daylighting above and ventilation below. Sobin designed the roof profiles based on lighting requirements, to let in natural light to illuminate the exhibits and designed the walls sections to meet the ventilation needs.

These three museums had identical architectural programs and similar plans. Sobin used these projects to demonstrate the impact of climate on the design of cross-sections, windows, and skylights. Several techniques deployed by him had been successfully used in these regions in vernacular architecture and they later became mainstream in energy conscious architecture. For instance, he proposed the museum in London be sunk under a mound (Fig. 5) to prevent heat loss from the building. The use of thick mud walls and courtyards in the Khartoum museum and the use of passive ventilation techniques, shading devices based on solar charts were the key features of Sobin's design solutions.[55]

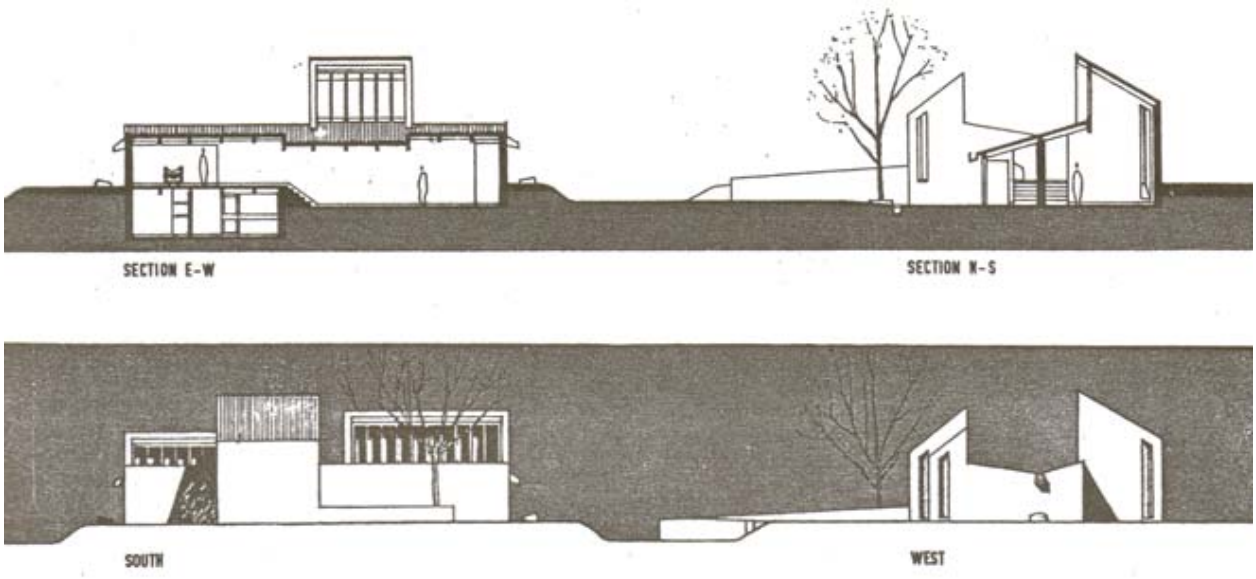

Fig. 5 A section through the London Museum designed by Harris Sobin, a student at Tropical Department at the AA (Source: Sobin, Harris J. "3 Museums." *Architectural Association Journal* Vol. 77, no. 860 (March 1962). p 209-15)

Green Architecture and Tropical Architecture are not coincidentally homologous discourses. The continuity between the two discourses is established is through practitioners who were trained at the AA and continued with careers in environmental design. Sobin became devoted to teaching environmental design in the United States in Arizona. K.K. Mumtaz, another alum of the AA Tropical Department, practices Green Architecture in Pakistan.[56] Its been established that the Tropical Architecture movement continued as environmental architecture in the Africa.[57]

This paper concludes by historicizing Tropical Architecture as the precursor to Green Architecture and opening up the intertextual space between the architectural cultures of the former colonies or the tropics, and their metropolitan counterparts.

Endnotes

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