

This study was specifically informed by the use of three themes in cultural studies. *Site* is used to suggest that ideological tensions are at play in specific spaces. The *body* is seen today to have a constructed identity that is defined and ordered by discursive practices. The *boundary* is used as a metaphor for the way discourses delineate fields of knowledge, sites and subjects. These boundaries are arbitrary but ideologically suffused constructs (Bhabha: 1994).

Site

The theme of site refers to the discussions of space and place that are found in cultural studies and post-colonial theory. These show how the impact of modern and colonial discourses is to displace localised knowledge of places, making the meaning of the site as a singular or stable term problematic. Modernist forms of knowledge are disembedded from local places (which are invested with traditional meanings) and deal instead with abstract qualities of space, which is a universal commodity (Giddens 1990). Through its economic and political arrangements, colonialism privileges the perspective of the metropolitan centre (King 1990). The agents of colonialism produce knowledge, such as maps, about distant colonised sites, but do so selectively in the service of the colonialist project.

The term site suggests a space that is not so much empty as it is the setting for a past or future event, such as processes of colonialism and modernisation. Describing these events involves the use of qualitative terms that capture the relationship of spaces and culture. For example, in an extensive review of work within urban studies, Jane M. Jacobs (1993) organises some ways of knowing the city qualitatively that had emerged in the previous decade. In these, the city “unbound” from its positivist definitions is alternatively described through methodologies that draw on social critiques, representational analyses and subjective readings such as feminism. These approaches challenge the boundaries and conclusiveness of disciplines such as statistical and cartographic survey that had traditionally described the city.

Jacob’s review points to the multiplicity of ways of knowing space, exemplified by the city, and by induction, of knowing non-urban spaces such as those of tropical architecture.

Within these perspectives, the meanings assigned to sites and site knowledge is provisional and historically produced.

Cosgrove's (1984) work on the social production of landscapes opens an approach to interpreting space that relates its cultural and material aspects. His work traces the emergence of what he calls a landscape idea in European thought. Representations of that landscape are charged aesthetic images that relate the material practices at work in a territory in cultural terms.

Cultural histories of the peripheral site in colonial space offer a useful set of metaphors by which colonial settlers describe foreign landscapes. From the perspective of the west, non-western sites are often invisible, empty, or unnameable. Carter's history of Australian settlement (1987) critiques the historical view of the country as "terra nullius", an empty landscape. The indigenous knowledge of the landscape was systematically replaced with colonial names and maps. In the context of South African literature, Coetzee (1988) has related the difficulty of English speaking writers in relating to a landscape with forms bearing little relation to their own vocabularies of geographical terms.

Body

In contemporary critical writing, the identity of the *body* is seen to have been constructed by discursive practices. The broad categories in which we commonly divide bodies such as race, gender and traditional/modern are forms of knowledge that have been built up historically in relation to power formations. In this study, it has been useful to draw out those definitions of the body that emerge within modernity, and specifically through the encounter of colonial powers with African subjects.

Foucault's studies (1976, 1977) of the birth of medicine and punishment show these fields as prototypes of scientific knowledge through which the modern body is defined and maintained. These fields develop various techniques which operate at a small scale to correct bodies which fall outside the norms which they define, and to reproduce appropriate embodied practices. This conception and maintenance of norms is a function of power, invested in the field through its status.

Within modernity, the apparatus of governments continues to mould bodies, and the practice of colonialism is no exception. King (1976) shows how the British military in colonial India were concerned with the health and (excessive) mortality of the soldier's body in this environment, and devised practices, including spatial solutions, to return it to metropolitan norms.

Discussions in post-colonial theory show how embodied practices are either produced or wiped out by the encounter between colonising nations and indigenous people. Yeoh (1996) explains how colonial power uses its domination to import "notions, systems and practices", specifically those that are assumed to be superior or beneficial, to a colonial context. In the process, indigenous practices are displaced. Within her example of colonial Singapore, the effects of this is not only the production of the built environment but the normalisation of certain embodied behaviours within it. These collectively order bodies through "the enclosing and partitioning of space, the organisation of the distribution of individuals in space, and the coordination and allocation of activities in time" (1996: 13).

Similar practices ordered African subjects. King notes how in Ghana local ways of organising social groups in space were deliberately avoided in the planning of modern settlements in order to fragment the traditional kinship networks that are sustained by traditional collective dwellings (1990: 58).

The loss of local embodied practices is not total, however, and Yeoh (1996) takes cognisance of the everyday practices of colonised subjects as potentially subversive forms of embodied behaviour. Through these strategies, local users appropriated the built environment for their own purposes. She notes, however, the invisibility of such practices, or the treatment of them as irrational or ignorant within the official records of that environment.

The discussions of resistance to colonialism in Africa in Fanon (1968) and Memmi (1990) refer to the nature of the colonised subject. Both texts, which should be seen as products of the time in which they were written, narrate the sense of inadequacy and loss which colonised Africans felt in relation to western culture. This constructed two poles of desire,

in which the African aspired to emulate the coloniser or to be free of his (sic) constraints in an embodied way. These discussions help to understand the phenomenon of appropriation of western practices such as modern architecture by African elites.

Boundary

Post-colonial theorists, notably Bhabha (1994) describe how the delineation of a discursive field requires the construction of boundaries. These conceptual boundaries are constructed by the establishment of difference. In discursive practices, a dominant group might define a subordinate group as outside or other. Said's study of Orientalism (1978) shows how the definition by western scholars of an Orientalist essence reflected an inaccurately monolithic culture in contrast to that of the West. While such boundaries may appear oppressive, understanding them as constructs allows them to be rethought. Many contemporary struggles attempt to subvert oppressive stereotyping along racial, cultural, sexual and national lines by recognising and rethinking binary divisions (Ashcroft 1998).

Boundaries are constructed in fields of knowledge whenever the field itself is defined by some privileged group. Nalbantoglu (1998) and Bozdogan (1999) show how professional bodies, for instance, tend to define who may call themselves an architect, and certain spatial practices are sanctioned by architects while others such as self-built dwellings, vernacular buildings, temporary structures, engineered structures and so on are seen as non-architecture. In these senses architecture as a discursive field establishes its own boundaries.

1.3 Methodology

1.3.1 Outline

This study researches climatic thinking through the discourse analysis of architectural work and theory produced during a specific period of about fifteen years. The analysis has unfolded through three stages: firstly, researching the approach to climate in material on

the modern architecture of West Africa; secondly, understanding it as discourse and finally, critically exploring that discourse in the light of contemporary knowledge. The first stage produced an archive which is evaluated in the second and third stages.

1.3.2 Archival research

The first stage of the study researched the approaches to climatic responsiveness in modern architecture of West Africa that existed in the records of the period. This material primarily takes the form of published works such as journals and books.

In the absence of existing historical or critical studies that deal specifically with climatic thinking in modern architecture in West Africa, this stage of the study involved sifting through publications on modern architecture in West Africa in order to locate references to climatic design in the form of texts, images, built work and institutional and professional structures.

The material that was first surveyed was the work of modern movement architects who practised in the Gold Coast and Nigeria in West Africa between 1945 and the era of African independence. Ghana was the first African nation to gain independence from its European coloniser in 1957. Since the period of intense building that characterised the pre-independence years concluded shortly after independence, the study of Ghanaian architecture concludes around 1960. In Nigeria, independence in 1960 had a less dramatic effect on building activity, and in this case, the first coup in 1966, that dampened economic activity, ends the period of study.

Published work available in South African libraries, primarily the Martienssen library at the University of the Witwatersrand, was the major source of material. By the fact of their availability in another Commonwealth country, these texts were representative of the core of climatic responsive design that would have been available to most practitioners at the time. The major professional journals published in Britain during the period of the study, the *Architectural Review*, *The Architect's Journal*, *Architectural Design* and *The*

Architect and Building News were scanned, turning up descriptions in over twenty articles on modern buildings in West Africa. A bibliography (Nel 1964) of architecture in sub-Saharan Africa provided some references to other journal articles.

Subject and keyword searches were used to locate the textbooks and practice guides on climatic responsiveness published during the period. The few available guides to modern African architecture were read. Additional written material including a thesis, unpublished papers, slides, brochures and journal articles was sourced from the interview subjects.

Bibliographic material on architects connected with climatic design was researched from a variety of sources. Biographical references were found in Emmanuel (1994). The few broad surveys of African architecture such as Kultermann (1963, 1969), Frampton (2000) and Elleh (1997) were consulted.

Two database searches were conducted using Dialog, which searches the RIBA, Avery, Architectural Publications, Dissertation Abstracts Online and Arts and Humanities Indexes. A number of terms including tropical architecture, architecture and climate, colonial architecture, African architecture and modern architecture (Africa) as well as the names of key architects were used in these searches. The limited results of these searches pointed to the scarcity of contemporary material on the architects and the concerns of modern architecture in Africa.

A database search of the RIBA library holdings revealed that it contains important archival material including photographs of modern architecture in West Africa, the papers of Maxwell Fry and a research report on the work of Jane Drew in Ghana. In view of the costs of obtaining this material, I decided not to include these, or to visit practices such as James Cubitt and Partners and Ove Arup that may have archived drawings and documents from the period. Obtaining material from practices that have closed down since the 1960's would have been a major undertaking, and was also considered impractical.

Using material that was published in the media creates a bias in the study towards the work of certain practices. Those architects with offices in London, who maintained links

with the editors of architectural journals and who frequented the Architectural Association had their work published with far greater frequency than those who were permanently stationed in West Africa. As a result, some practices, such as Design Group Nigeria and Nickson and Borys are barely mentioned in the metropolitan media.

From the material that was surveyed certain key areas of work were identified for more thorough analysis. This phase of the work looked at certain buildings in Ghana and Nigeria that were the subject of more attention than others, in that their scale, the time at which they were built and the status of their architects set them out as significant projects. Other discursive outputs, the most significant institutional events, were also explored. This focused on the manual, *Tropical Architecture in the Humid Zones* (Fry and Drew 1956), the proceedings of the Conference on Tropical Architecture held in London in 1953 (Foyle 1954) and the curriculum of the Course in Tropical Architecture run at the Architectural Association from 1954 onwards.

This material was used to build up a comprehensive record of all the buildings found that in some way were designed in response to climate. This was originally formatted as a chronological table of buildings designed to include images, dates, architects, bibliographic sources and a description of the climatic devices in each building, set alongside a time line of major publications, professional events and political changes. This table was used to obtain an overview of the period and its building types and their climatic responsive elements.

In compiling the table, however, it became clear that the format, by listing all projects individually, was obscuring some relationships. For instance, major building programmes such as the Gold Coast schools commissions of the late 1940's created a sustained and linked period of work, whereas other buildings, especially commercial ones, were designed on an individual basis. A reformatted table, based on a timeline, that groups major projects and specific climatic responses as well as theoretical contributions, was prepared. This appears as Table 1. In addition, the works of the architectural practices active in the period are listed in a separate list that is an appendix to the thesis.

While the research primarily focussed on published projects, this record was not comprehensive. However, given certain personal and financial limitations on the amount of field research that I could do, this was limited to a visit to Ghana for a week in January 2001. Most of this time was spent in Kumasi, where I stayed on the university campus and visited and spent time at all of the modern academic buildings and a representative selection of some of the houses built in the 1950's. These included those buildings designed by James Cubitt from 1951 to 1954. Following this, I went to five schools designed by Maxwell Fry and Jane Drew in the 1940's and 50's in Kumasi, Aburi and Cape Coast. The case studies of Cubitt and Fry and Drew's work were selected not so much as typical examples of the Tropical Architecture but as significant examples of climatic thinking. These buildings were all photographed or sketched, and the staff and inhabitants in these buildings were interviewed to understand their history and contemporary uses.

I was accompanied on all these visits, with the exception of Aburi and Cape Coast, by Ghanain architects. In addition to the buildings visited, they pointed out number of modern buildings in the centres of Kumasi and Accra, and I sketched or photographed a number of these.

Interviews were conducted with five architects concerned with climatic design. Prof. John Awuso-Addo, a Ghanain practitioner and graduate of the AA course, was interviewed in Ghana in January 2001. Prof. John Godwin and Jillian Hopwood, a husband and wife partnership who have practised in Nigeria since 1954, visited Johannesburg in October 2001, and I interviewed them there over two and a half days, and they presented two slide shows of their work. In London in August 2001, I visited Babar Mumtaz of the Development Planning Unit, who had studied in Ghana in the 1960's. Prof. Alan Lipman, who had worked in Fry and Drew's office in the 1960's was briefly interviewed by telephone and asked to comment on a draft of the thesis.

1.3.3 Climatic discourse

In the second stage of the study, the climatic thinking in the archive of modern

architecture in West Africa is treated as discourse. This draws on Foucault's concept of discourse (1972). Foucault used discourse to refer to a field of social knowledge with particular enunciative limits, and which produces certain themes or theories. The authority of the field is maintained through unspoken rules about what can be said within it. The control of these rules is in the hands of those who, through their position in the institutions that produce knowledge, have power over its [re]production.

Understanding climatic thinking in the study period as a form of discourse entails seeing it as a collectively produced field, linked to institutional arrangements. As a field of knowledge, climatic thinking was constructed, defined and reproduced through professional norms, the collective knowledge contained in professional literature, and the formal and informal ties between colleagues and experts.

Although the form and position of buildings is what makes them responsive to climate, these forms are determined theoretically. By understanding these forms and the collective knowledge behind them as the product of discourse, this study suggests that they belong within a bounded field that reflects and extends unsaid rules about what can be designed and known. The effect of this in climatic discourse would be the inclusion of certain spatial practices, and the exclusion of others. The first central chapter, Chapter 2, Tropical Architecture, describes how a concept of "tropical architecture" was established to codify proper techniques, including climatic responsive design, for the practice of architecture in tropical colonies.

As the field of study is associated with colonialism, it is useful to refer to the concept of colonial discourse as developed by Said (1978, 1992) from Foucault's term. In *Orientalism*, Said treats colonial texts on the Orient as a form of discourse that produce a collective representation in which a highly debatable Oriental "essence", defined on the basis of a geographical location, is constructed. Through the power of colonialism, colonizers have control over what can be known about the Orient, and even non-western scholars need to work within this field, a situation which reproduces the dominance of colonial knowledge and power. In this study, the concept of the tropics is seen as an essentialist construction, formed by, and forming the domain of operation for the expert practice of climatic

thinking.

Discourses enact power, both that of the colonising nation, and the forces of modernisation. They show signs of coercion as certain groups impose their own knowledge, disciplines and values on dominated groups. They foster assumptions about the dominated group, which members of that group come to believe, that see colonial knowledge as superior, and the world of the colonized as primitive. This process creates a loss as the knowledge which structures indigenous discourses is rendered invisible and disappears or is marginalised.

Colonial discourse also excludes the reasons for the creation and maintenance of the system and the exploitative means of achieving this in its expressions. It portrays itself instead as a beneficial approach. Modernist discourse, or modernity, is characterised by rapid and wide ranging change and the introduction of modern institutions. The statements of modernism, which are often couched in the language of rationalism, show the dominance of European thought.

Colonial discourse operates within cultural forms such as imperial literature (Said 1993). In fact, the task of forming cultural knowledge of its distant sites is central to the project of imperialism, an observation which underscores the large and influential domain of post-colonial studies in literature (Ashcroft et al 1998) and more recently in the spatial disciplines (Nalbantoglu and Wong 1997).

Drawing from post-colonial theory, this study treats climatic thinking as an aspect of broader colonial and modernist discourses that shape the environment and its subjects. In order to do so, the study undertook an overview of its context in the colonial and post-independence periods in West Africa. The period was studied through historical and economic surveys of Ghana and Nigeria which record the effect of the major political movements of the period on the domains of urban development, educational policy, infrastructure and foreign investment which in turn impacted on architectural design services. This record relates the provision of buildings in West Africa to political or economic programmes.

To understand the modernist discourse in climatic thinking, it is necessary to have a broad awareness of its relationship with other expressions of architectural modernism. Surveys of modern architecture (Frampton 1992, Curtis 1996) and selected writings of le Corbusier (1946) , Gropius (1955) and Hannes Meyer (Conrads, 1970) were read.

It was also important for this study to understand the practices that lay outside the discourse of colonial modernism in order to see its exclusions. In this respect, novels written by West Africans give a picture of the spatial practices of local subjects during the same time period (Achebe 1974, Armah 1969, Selormy 1967). Visiting the buildings and observing them in use gave interesting perspectives, as did interviews and meetings with architects. As has been documented in relation to other periods (Crawford 1991), the public record that architecture presents is often at odds with its “inside” stories.

1.3.4 Critical readings

After building up an understanding of climatic thinking as a discourse in its own right and as an element of colonialist and modern discourses, the study examined its effects through a series of critical readings. In these, three broad themes were selected as the locus in which these effects might appear. These themes, as key concerns in critical theory, attempted to clarify how the concepts of site, the human body, and the boundary are [re]produced in the discourse. These terms pass from a material realm to ideas and back again to a material form in the course of architectural production.

While these themes have taken on an ideological significance in their use in contemporary critical theory, their use in architectural discourses is seldom problematised. For many architects, bodies, sites and boundaries are understood in a normative way. Their dimensions are often represented empirically or at least abstracted, allowing a representative body to stand for the users of the building, or a line to demarcate a boundary. These entities and the language used to describe them within architecture are seen as stable or universal terms.

The discrepancy between the critical and architectural understandings of these terms

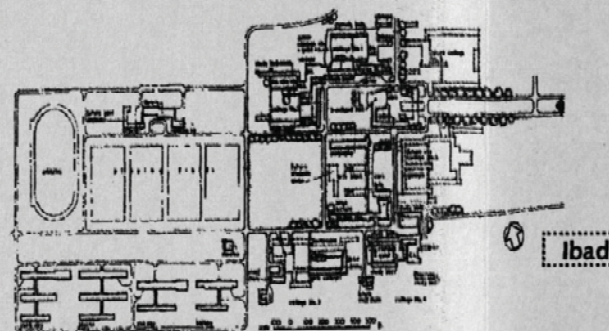
suggests a method for interrogating the discourse of climatic responsiveness. Critical theory develops critical understandings of terms that, when opposed to the normative uses of the same terms in climatic discourse, create a productive tension. Through these discrepancies, hidden meanings might be assigned to the terms that architectural language uses normatively. Moreover, a concrete dimension might be assigned to theoretical concepts.

To break down this method further, this study initially read the discourse through three separate processes, looking at it alternately in terms of its treatment of the site, the body, and the (building) boundary. While this proved to be an unwieldy way to present a narrative that has other linkages, the themes run through the more conventional arrangement of the study. For instance, the theme of the site is explored in the first three central chapters: Tropical Architecture, Representing the Tropical and Making Buildings. The body is critically examined in the chapter on Comfortable Bodies, and informs some observations in the chapter on Revisiting Tropical Architecture. The concept of the boundary in a loose way runs through the entire study, while the third of the central chapters, Making Buildings, looks at the definition of the building envelope as a boundary between a modern and western interior and its surroundings.

1.3.5 Summary

The methodological approach of the thesis does not follow any single procedure, but rather splices empirical recording with more critical readings of the archive that this generates. The three stages of this study, archival research, discourse analysis and critical readings described above did not always happen sequentially. They might be more accurately described as different perspectives, each illuminating how the others are in effect provisional narratives. The intention of the thesis in using critical approaches was not to write a more accurate empirical history of the period. Rather, drawing from a number of precedents in recent architectural theory and history, it uses discourse analysis as a tool that could unsettle and dispute normative descriptions of architecture such as those found in the archive of architectural journals.

1.4 Table 1



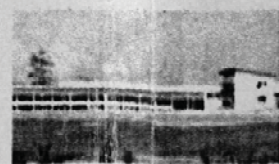
1. Fry and Drew: Ibadan University Plan 1947



14

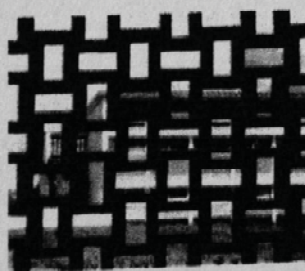


15 Mampong

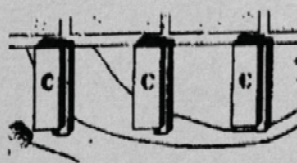


17 Apowa

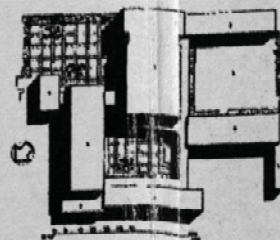
Gold Coast Schools building programme



29. Breeze block walls



30. single banked classrooms



31. semi open courtyard plan

1945

1946

1948

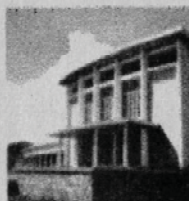
1944: Fry and Drew go to West Africa as planning advisors to colonial government

World War 2 ends

Fry and Drew (1946) *Village Planning in the Tropics*;
le Corbusier (1946) chapter on the *brise soleil* in *Oeuvre Complet*



TROPICAL ARCHITECTURE



2. Ibadan Hall



3. Ibadan University library

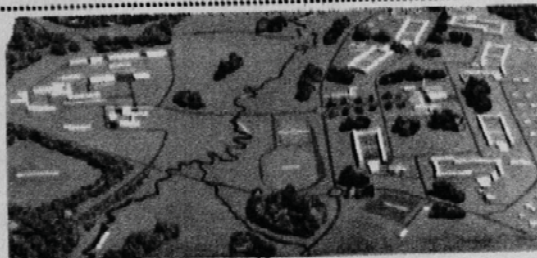


4. Residence

Ibadan University

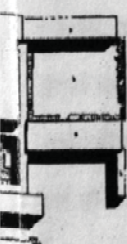


16 Aburi



19 College of Technology Master Plan

College of Technology, Kumasi



courtyard plan



32. Pivot windows



33. pivot windows



34. vertical louvres



35. sunscreen

1948

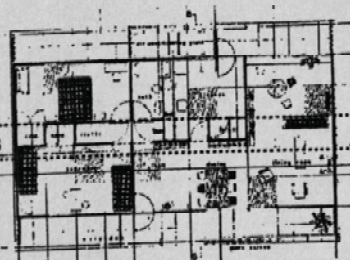
1950

1952

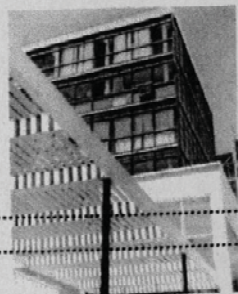


5. Ansar-ur-deen School

Ecumenical schools building programmes



13. The Cruden Tropical House



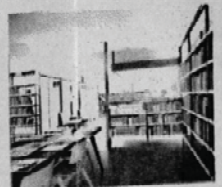
6. Fry and Drew,
Cooperative Bank of
Western Nigeria



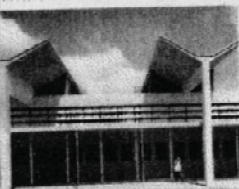
7. Godwin and
Hopwood, Boyle
St residence



Wesley Girls' School



23. Branch libraries
Library building programme



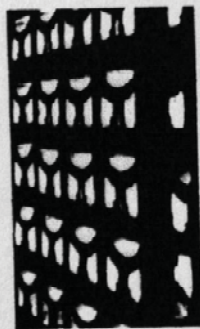
Engineering workshop



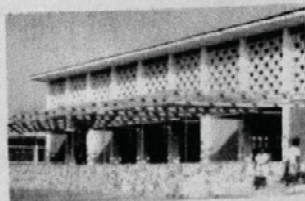
21. type "B" house



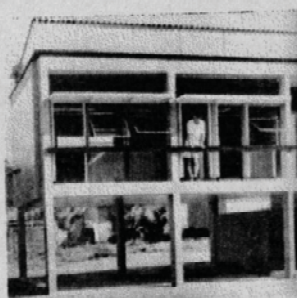
22. National museum



36. pattern blocks



37. tilt up doors



38. raised accommodation



39. Timber framed house



40. clerestory window

1952

Federal rule in West Africa

1953: Conference on Tropical
Architecture held at University
College, London

1954

New town built at Tema,
Gold Coast

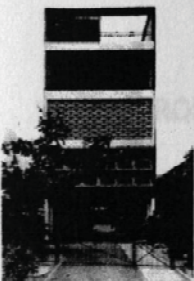
Course on Tropical Architecture at
the Architectural Association,
London

Special editions of the *Architectural
Review* on tropical architecture

Ove Arup opens branch office in
West Africa

1956

*Tropical Architecture
Zones* (Fry and Drew)



7. Godwin and Hopwood, Boyle St residence



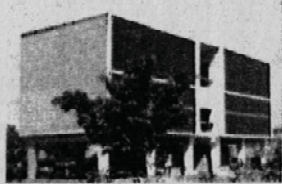
8. Godwin and Hopwood, Allen and Hanbury's, Lagos



9. Oluwale Olumuyiwa



libraries
building programme



24. Library school



25. Scott, own residence



26. Architecture school, Kumasi



40. clerestorey windows



41. courtyard cooling



42. sliding horizontal louvres



43. "Naco"

1956

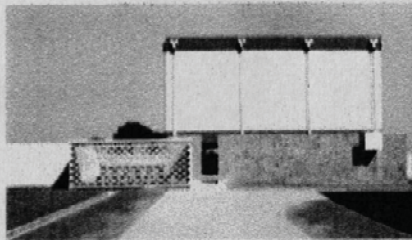
1958

1960

5 March 1957: the Gold Coast becomes the independent nation of Ghana

27 April: Niger independent nation

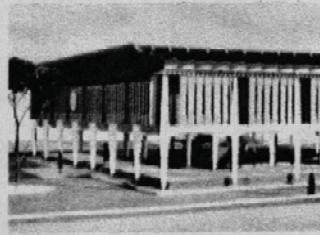
Architectural Architecture in the Humid Tropics (Fry and Drew 1956)



10. Northern Police College



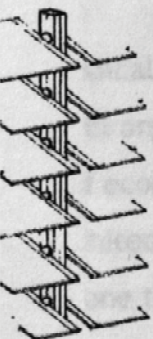
11. New Nigerian Newspaper Press



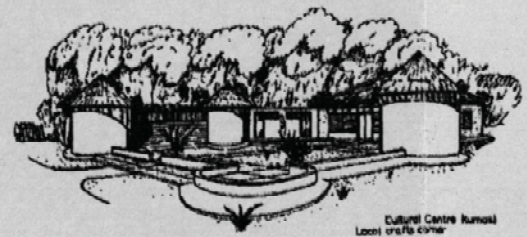
27. American embassy



28. Christianborg housing



"Naco" louvres



44. Neo-vernacular earth and grass

50

1962

1964

Nigeria becomes an
ent nation

Richards (1961) *New Buildings in
the Commonwealth*



45.



11. New Nigerian Newspapers Press



12. Elder Dempster Shipping line offices

LIST OF FIGURES

1. Fry and Drew **Ibadan University Plan** (AD 1955:154)
2. Fry and Drew **Trenchard Hall**, Ibadan (AD 1953:302)
3. Fry and Drew **Library**, Ibadan (AD 1955:161)
4. Fry and Drew **Student Residence** (AD 1955:164)
5. Co-Partnership **Ansar-ur-deen School**, Lagos (AD 1959:130)
6. Fry and Drew **Co-operative Bank of Western Nigeria** (Kultermann 1963: 20)
7. Godwin and Hopwood **Boyle Street Residence** (Fry and Drew 1964: 66)
8. Godwin and Hopwood **Allen and Hanbury's** (photo by Gillian Hopwood)
9. Oluwole Olumuyiwa **Crusader House** (Kultermann 1969:)
10. Godwin and Hopwood **Northern Police College Kano** (photo by Godwin and Hopwood)
11. Godwin and Hopwood **New Nigerian Newspaper Press** (Lock 1967: 123)
12. Cubitt and Banks **Elder Dempster Shipping Offices**, Lagos (RIBA Jnl 1977:249)
13. Douglas Stephens **The Cruden Tropical House** (Walter 1955:55)
14. Fry and Drew **Gold Coast Schools** (Fry 1972)
15. Fry and Drew **Akropong School** (AR 1953: 302)
16. Fry and Drew **Aburi School** (AD 1955:151)
17. Fry and Drew **Apowa School** (AD 1955: 145)
18. Fry and Drew **Wesley Girls' School** (AD 1955: 142)
19. James Cubitt **College of Technology Campus Kumasi** (Kultermann 1969: 97)
20. James Cubitt **Engineering workshop** Kumasi College of Technology (AD 1959:114)
21. James Cubitt **Type "B" housing** Kumasi College of Technology (Richards 1961: 113)
22. Fry, Drew, Drake and Lasdun **National museum**, Accra (Frampton 2000:)
23. Kenneth Scott, **branch library** (Evans 196-:77)
24. **Library School** (Evans 196-:110)
25. Kenneth Scott **Own residence** (Fry and Drew 1964: 55)
26. Charles Hobbis **Architecture School**, Kumasi College of Technology (Richards 1961: 110)
27. Harry Weese **American Embassy**, Accra (Kultermann 1963: 12)
28. Ministry of Works, Ghana (DA Barrett architect) **Christianborg housing** (Richards 1961: 107)
29. Fry and Drew, breeze block walls, **Akropong School** (Fry and Drew 1956: 88)
30. Fry and Drew, single banked classroom plans (AR 1953: 304)
31. Fry and Drew, semi open courtyards plan, **Accra community centre** (AD 1955:167)
32. Architects' Co-partnership, pivoting school windows, **Ansar-ur-deen school** (AD 1959:131)
33. Architects' Co-partnership, pivoting school windows, **Ansar-ur-deen school** (AD 1959:129)
34. Architects' Co-partnership Vertical louvres **IDC building** (AD 1959: 130)
35. Crittall windows sunscreen (Crittall 1953)
36. Fry and Drew, patterned breeze blocks, **Opukuware School** (photo by Hannah le Roux)
37. Fry and Drew, tilt up doors, **Mawuli School** (AD 1955: 145)
38. Architects Co-partnership **raised accommodation, offices** (ABN 1957:704)
39. Architects Co-partnership **Timber framed house**, Enugu (AD 1959:133)
40. Kenneth Scott clerestorey windows, **branch libraries**, Ghana (Kultermann 1963:113)
41. James Cubitt, courtyard cooling, **house** (AR 1956:259)
42. Architects co-pJames Cubitt, sliding horizontal louvres, **house** (ABN 1957: 709)
43. "Naco" louvres (Fullerton 1970: 123)
44. Neo-vernacular earth and grass, **Kumasi cultural centre** (Fullerton 1970: frontispiece)
45. *The West African Architect and Builder*, cover 1967



al Centre Kumasi
1964

1964

1965

2. TROPICAL ARCHITECTURE

2.1 Outline

This chapter describes how climatic thinking in the architecture of West Africa was situated within a broader field of architectural activity. It begins outside the study period, outlining how climatic difference was the impetus for formal innovations in modern architecture in other earlier experiments in non-western locations.

It then traces the development of the approach that became known as tropical architecture, in which climatic responsiveness plays an important role. It shows how the concept of tropical architecture was one that was self-consciously constructed to describe and promote the work being done by modernist practitioners in a number of locations outside the west. In the context of post-war British architecture, these sites were the colonies in West Africa, South East Asia, Australia and the West Indies. The term tropical architecture became established through its representation as an avant-garde movement in books and journals, a conference, and the establishment of an elite school.

Tropical architecture referred to something other than colonial architecture, although, as I will argue later, it incorporated both colonial and modernist aspects. Changing political and economic opportunities prompted architects to develop a post-colonial identity for architecture, which was done through the self conscious representation of their approach as one that could transcend international boundaries.

Contained within the concept of tropical architecture is a consistent approach to climate. Certain conventions were developed by architects to deal with conditions of difference with which they were confronted in practising between metropolitan and colonial locations. Forms of building that came from western climates failed in the hot and humid tropical sites, while local practices which dealt with the climate were deemed inappropriate in relation to modern programmes.

The central concept of tropical architecture as it was developed by British architects in

West Africa was one in which the social differences between the west and tropical nations, and between tropical countries themselves, were subsumed within an overriding logic of climatic responsiveness. Using a modern and empirical “apparatus of thinking” about climate (Fry 1972) that substitutes western science for local traditions, architects developed rational responses to climate that could be applied to the design of buildings throughout the tropical regions. Even when architects left West Africa, their approach to climate could be transplanted to other countries. This explains, in part, the longevity and widespread popularity of modern climatic thinking that has been described elsewhere in the study.

The chapter argues that the development of tropical architecture, through international networks and in the media, built on colonial networks. The concept of tropical architecture, which promotes the value of comparative scientific knowledge, in turn reinforces the authority of metropolitan centres. In this respect, its influence remains apparent in the discourse of modern West African architecture, even after independence.

2.2 International precedents

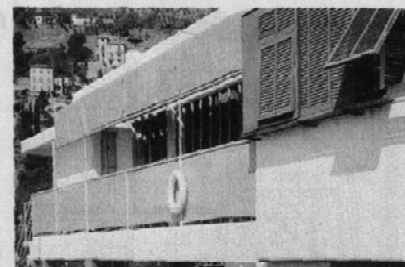
Tropical architecture built on the several international movements and figures. Contemporary histories give a number of architects credit for extending the early, European phase of modernism into an approach that would suit sites elsewhere. This often entailed the design of alternatives or additions to the sheer and well-glazed facades that modernism promoted that, although useful in the winters of Western Europe, performed as greenhouses in warmer conditions. A Greek architect, Stamo Papadaki, had experimented with the use of sun breakers and deep overhangs to control sun penetration prior to 1921 (Aronin 1953:83). In the 1929 design for her seaside house, E1027, Eileen Gray used a variety of shading devices, including adjustable, sliding louvres and canvas awnings to allow variable control of the sun (Hecker 1993) (Fig 2.1).

In the 1930's, Brazilian architects began to effect sun control through

the design of building facades with a strong formal effect. Between 1936 and 1943, Lucio Costa and colleagues, with le Corbusier as a consultant, designed a new office building for the Ministry of Education. The design used sets of adjustable horizontal louvres, set into a three-dimensional gridded facade made from reinforced concrete, to allow ventilation and the entrance of solar radiation to be controlled from inside the building (Goodwin 1943). The aesthetic effect of the tall building with its everchanging contrasts of light and shade was startling and innovative (Fig 2.2). Le Corbusier claimed credit for the idea, somewhat belatedly, in a section on the *Brise Soleil* in the 1946 edition of his Complete Works (Le Corbusier 1946: 103).

The thermal performance of the Salvation Army building in Paris, that had a glazed south facing wall but no sun breakers, and which resulted in intolerable internal temperatures in summer, had been a failure for le Corbusier. He had been forced to augment the mechanically ventilated and heated systems with opening windows, undermining his original concept of a *mur neutralisant* which would isolate the internal air, heated or chilled to 18 degrees Centigrade, from external conditions (Banham 1969:158). The Brazilian application of the *brise soleil* gave a solution that would allow the use of glazed facades in hot climates in a way that was conceptually similar. It is not surprising that le Corbusier's development of the *brise soleil* follows the expansion of his career into the hot climates of Tunisia, Algeria, Brazil, and India (le Corbusier 1946) between the 1930's and 50's. His designs for two highrise buildings in Algiers, the 1933 apartments (le Corbusier 1935:170) and the 1939 business centre use reinforced concrete brise-soleils (Fig 2.3).

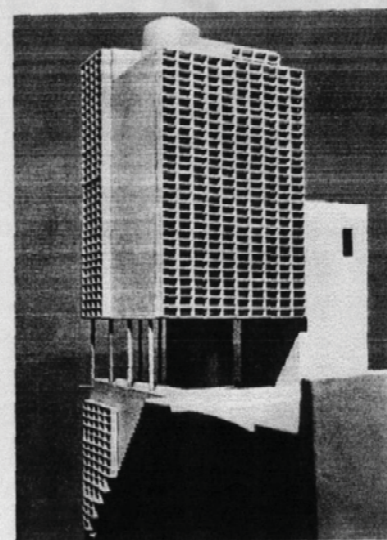
Le Corbusier's leading role in the avant-garde modern movement gave his use of the *brise-soleil* an authoritative stamp, and claimed it from



2.1 Eileen Gray, **E1027**, Roquebrune, 1929 (Hecker 1993: 73)



2.2 Lucio Costa and others, **Ministry of Education Building**, Rio de Janeiro 1936-43 (Goodwin 1943: 107)



2.3 le Corbusier, **Maison Igitif**, Algiers, 1933 (le Corbusier 1946: 110)

the Brazilians for an international application¹, fulfilling his vision of an “international” style.

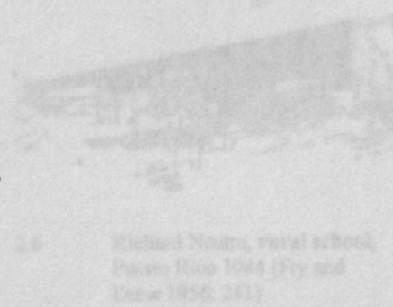
Le Corbusier’s experimentation was in line with the principles of modernist research into solar ingress in housing. Bauhaus practitioners, notably Walter Gropius and Hannes Meyer, had used sun diagrams in the 1920’s in order to create empirical standards for building spacing (Conrads 1970). Their concern was allowing sufficient sunlight to enter buildings, in contrast to the dark conditions in which many people lived in European cities. Although the post-war modernists were concerned with reducing heat and glare, such precedents were influential in establishing climatic thinking into the design of buildings. The approach of using diagrams as an explanatory tool was also a modernist technique that was to prove influential.

Almost simultaneously with the publication of le Corbusier’s account of the *brise-soleil*, the American avant-garde was establishing their own vocabulary of practices for hot climates. Frank Lloyd Wright’s interest in climatic aspects of architecture had played out in the use of elements such as water, thick walls, deep overhangs and ventilation (Banham 1969). Although Wright did not design in a hot and humid climate, his former student and collaborator, Antonin Raymond, was the co-designer of an influential tropical house for Guam around 1946 (AF 1947) which served as a prototype for official American housing abroad, and influenced the design of the American embassy in Ghana (Fig 2.4).

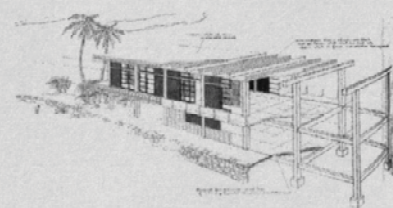
¹ The birth of Tropical Architecture coincides in time with the end of a monolithic international movement of modern architects. The International Congress of Modern Architecture (CIAM) led by le Corbusier has its tenth and last meeting in 1956 after a stormy meeting three years earlier (Frampton 1992). Prior to this, international modernism had already begun to show strong nationalist tendencies in a number of locations, notably Brazil (Goodwin 1943, Curtis 1996). One could only speculate whether, without le Corbusier’s intervention, the *brise soleil* would have been disseminated, and Tropical Architecture as a style given such an identifiable motif.



2.3 Paul Rudolph, Corbusier House, Florida, c1944 (Fry and Dow 1956: 13)



2.5 Richard Neutra, rural school, Pinar del Rio 1944 (Fry and Dow 1956: 241)



2.4 Raymond and Rado, Cable station housing, Guam, c1946 (Arch Forum 1947: 94)

The diaspora of modern architects from Germany caused by the Second World War spread the rationale of modernism to new sites including those of the tropical southern parts of the United States (Emanuel 1994). Walter Gropius was appointed as head of the Harvard Graduate School of Design in 1937. Amongst his early graduates was Paul Rudolph, whose designs for houses in Florida in the 1940's develop the use of shading devices and sliding doors in response to heat (Fig 2.5). Richard Neutra, another architect with roots in European modernism based in the United States, experimented with shading and tilting walls in designs for schools and clinics for Puerto Rico in 1944 (fig 2.6).



2.5 Paul Rudolph, **Cacaoon House**, Florida, c1944 (Fry and Drew 1956: 75)

Information about these experiments was circulated amongst architects in different ways. Rudolph, Raymond and Neutra all had their work published in professional journals while le Corbusier's extensive contacts with other architects through the CIAM congresses and his travels put him in a leading position to articulate and define new directions. The influence of this work on the British definition of Tropical Architecture is overt.



2.6 Richard Neutra, **rural school**, Puerto Rico 1944 (Fry and Drew 1956: 241)

2.3 The movement of Tropical Architecture

2.3.1 The British idea of tropical architecture

The modernist experiments in hot climates reached British architects through their contacts with key figures in the modern movement as well as through journals. In the 1930's, Maxwell Fry, as a member of the so-called MARS group had participated in CIAM congresses (Fig 2.7), and between 1934 and 1937 he went into partnership with Walter Gropius who was in exile from Germany (Emanuel 1994). In their positions as editors of the Architect's Year Books, Fry and his wife,



TOP-ROW 1. (Left to right)

1. Milton (England).
2. Brown (England).
3. Rogers (Italy).
4. Codercreutz (Finland).
5. Grannasztai (Hungary).
6. Hruskai (Czechoslovakia).
7. Neumann (Czechoslovakia).
8. Marshall (England).
9. Kadeigh (England).
10. van Bodegraven (Holland).
11. Entwistle (England).
12. Richards (England) Jim
13. Elle (Holland).
14. Samuel (England).
15. Roth (Switzerland).
16. Emery (Algeria).
17. Bihouwer (Holland).
18. de Vries (Holland) Rouke
19. van den Broek.
20. Kloos (Holland).

21. Kleykamp (Holland).
22. Michel (Belgium).

ROW 2.

23. Cadbury-Brown (England).
24. Shephard (England).
25. De Syllas (England).
26. Cox (England).
27. Moffett (Ireland).
28. Batista (Cuba).
29. Arroyo (Cuba).
30. Fuchs (Czechoslovakia).
31. Honnegger (Switzerland).
32. Fisher (Hungary).
33. Steiger (Switzerland).
34. Mrs. Stam Boese (Holland).
35. Katona (England).
36. Pritchard (England).
37. Bakema (Holland).
38. Hogan (England).
39. Singer (Czechoslovakia).

ROW 3.

40. Papadaki (U.S.A.).
41. Morton Shand (England).
42. Rosenbeig (England).
43. Martin (England).
44. Goldfinger (England).
45. Jensen (England).
46. Ling (England).
47. Ferrari Hardoy (Argentina).
48. Mrs. Wiener (U.S.A.).
50. Maxwell Fry (England).
51. Wells Coates (England).
52. Townsend (England).
53. Krejcar (Czechoslovakia).
54. Oberlander (Canada).
55. Schütte (Austria).
56. Merkelbach (Holland).

ROW 4. (Front row).

57. Le Corbusier (France).
58. Vianro (Argentina).

59. Sadie Speight (England).
60. Susan Cox (England).
61. Málnai (Hungary).
62. Mrs. Málnai (Hungary).
63. Barbara Randell (England).
64. Monica Pidgeon (England).
65. Sert (U.S.A.).
66. Girdion (Switzerland).
67. Jane Drew (England).
68. van Eesteren (Holland).
69. M. da Silva (India).
70. Gropius (U.S.A.).
71. Mrs. Fischer (Hungary).
72. Blaudche Limco (Canada).
73. Kalkvada (Czechoslovakia).
74. Mrs. Sert (U.S.A.).
75. Mrs. Schütte (Austria).
76. van Tregan (Holland).

2.7 CIAM Bridgewater meeting, 1947. Le Corbusier and Gropius present along with Fry and Drew . (Tzonis, Lefaivre and Stagno 2000: 32)

Jane Drew, sourced images of international work.

The architecture of British modernists in the tropics shows qualitative similarities and differences when compared with pre-war experiments in climatic responsiveness. As had happened in Brazil, a number of practitioners working in contact with each other constructed a collective architectural approach by sharing their experiments. As in pre-war modernism, the architectural mass media and conferences were used to disseminate these approaches to fellow practitioners. Scientific approaches to climate were used to justify formal decisions.

In contrast to earlier experiments, few of the buildings produced in international British modernism have been singled out as remarkable innovations in a formal sense in subsequent histories. Their built work was widely (rather than extraordinarily) innovative in that it rapidly absorbed modern concepts into many different types of buildings. In

this sense, it drew many of the forms first invented in the pre-war period, such as the *brise soleil*, raised floors and adjustable louvres, into use in the everyday built environment.

More significantly, the British architects who practised in the tropics managed to construct the concept of tropical architecture as a unified approach to design for the tropics. This was orchestrated through the representation of tropical architecture as an avant-garde movement in books and journals, a conference, and the development of course material. The period could be seen as one in which institutional support transformed experimental ideas into a new orthodoxy. These media, as this section will describe in some detail, developed ideas in dialogue between practitioners and theorists.

The Conference on Tropical Architecture held at University College, London in 1953 was a critical event in the development of the idea of a specific approach to architecture. The conference was centred on technical concerns, with a day devoted to climate, another to a visit to the Building Research Station in Watford and a third on construction issues. These were preceded by a discussion of planning problems and concluded with another on “the Position of the Architect in the Tropics”.

By holding the conference, members of mainstream British practice acknowledged the opinions voiced by foreign students that there were absences in the canon of architectural education. The event had been suggested by a Nigerian student, Adedokun Adeyemi. As Koenigsberger explained later,

“By 1953 students of architecture from tropical countries has begun to complain that they were learning all about snow loads on roofs and about fireplaces but next to nothing of the design of houses in hot climates.” (AJ

At the same time the conference provided support for British practitioners who wanted to work in “developing” countries, and an opportunity for experienced practitioners to compare experiences.

Despite the foreign students role in motivating for the event, they were not represented in the list of speakers in the proceedings (Foyle 1954)². Only the discussions record their names and home countries: Jaiyesmi (Nigeria), W.Lim (Malaysia), H. Lawson (Jamaica), SD Sane (India) and so on. This absence from the record of “tropical” voices is to recur in other media in the discourse.

The conference had several direct consequences. The first was the establishment of a specialist course in Tropical Architecture that was located at the Architectural Association in London. The six month course first ran in 1954 and augmented subjects in the main school of architecture to cover “those aspects of architecture where problems are different under tropical conditions” (Architectural Association 1954). In the beginning the department was concerned almost exclusively with the teaching of climatic design (AJ 1982:37). By 1959 the course had strong technical input from researchers at the Building Research Station and the London School of Hygiene and Tropical Medicine as well as lecturers in anthropology, housing and economics.

In October 1953 and January 1954, *Architectural Design* published two special editions on Tropical Architecture, edited by Otto Koenigsberger, that built off the themes of the conference.

“At the Tropical Architecture Conference in London last

2

Adeyemi's paper on “Architectural education and Training in the Tropical Countries” appears as an appendix

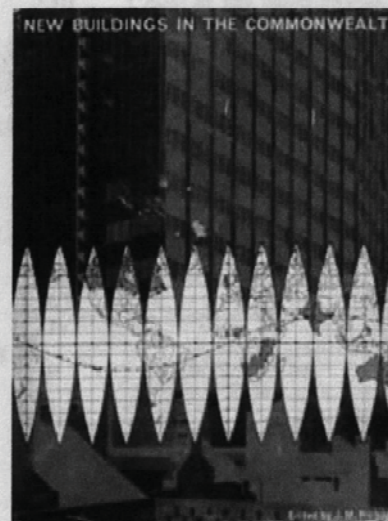
spring, it became obvious how enormous is the task facing planners and builders in the tropics, and how great is the need for the accumulation and dissemination of information on the whole subject of building for the tropics. A great number of architects practising in this country are now taking on large contracts in the hotter regions, so the whole of this issue of *Architectural Design* is devoted to such work" (AD 1953:268)



2.8 Cover of special edition of the work on Fry and Drew (AD May 1955)

The issues published the work of James Cubitt, Fry, Drew and partners, Nickson and Partners from West Africa alongside work in the West Indies and other African sites and brought recognition of the field to the mainstream readers of the professional journal.

Several other articles on Tropical Architecture followed in the 1950's (Fig 2.8), and in 1956, the first of a number of practical manuals aimed at students and practising architects was published. Maxwell Fry and Jane Drew used the term "Tropical Architecture" in the titles of both of their manuals (1956, 1961) which gather together case studies and data from diverse countries. A similar but more modest book on tropical houses was published by David Oakley (1961) who had worked in Jamaica. Textbooks published for students included a *Grammar of architectural design with special reference to the tropics* (Danby 1963) and a guide to construction in the tropics (Fullerton 1978). Work from Africa also appeared in a series of articles, divided into tropical and temperate sites, that were published in the two special editions of *the Architectural Review* edited by Nikolaus Pevsner (AR 1959 a, b) and subsequently issued as a book on *Commonwealth Architecture* (Richards 1961) (Fig 2.9).

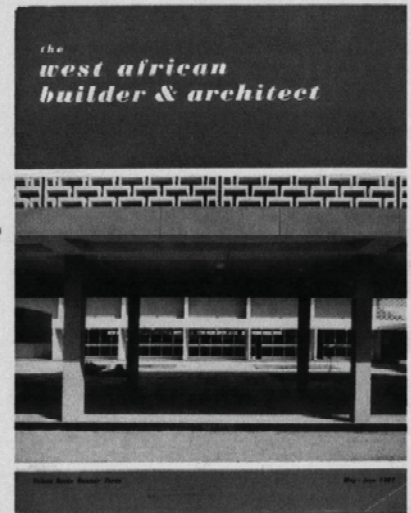


2.9 Cover of *Commonwealth Architecture* (Richards 1961)

The most thorough technical guide on Tropical Architecture was probably the manual compiled from lecture notes and feedback from

former students by Koenigsberger, who taught on the subject of climate in the course on Tropical Architecture. However, this was only published in 1974. In the meantime practitioners had technical guides from the Building Research Establishment for support. Published as *Colonial Building Notes* and later as *Overseas Buildings Notes*, these covered topics such as thermal comfort and building materials (BRE 1950-58).

A certain amount of material was available from other countries. Aronin's survey, *Architecture and Climate* (1953), and the works of the Olgyay brothers (1963) mainly covered built work and research from the Americas. Dreyfuss wrote a book in 1960 that drew from experience in French colonies (Kitio 1992). A professional journal, *The West African Architect and Builder*, was started in West Africa around 1960 (Fig 2.10). The building research stations in South Africa and Australia produced technical guides, and clearly there was communication between research stations. Yet the material reaching practitioners was regarded as inadequate for the needs of architects in foreign situations. In the 1950's, G. Anthony Atkinson, an architect and advisor to the British Building Research Establishment mentions "Housing in the West Indies" and the Information Books of the Nigerian Public Works Department (Foyle 1954:41) as the few guides to practice an architect might have at his [sic.] disposal. Such local bye-laws that exist are "rarely up to date". This anxiety about the adequacy of the architect's technical knowledge in terms of its breadth and currency recurs in many discussions.



2.10 Cover of *The West African Architect and Builder* (1967)

2.3.2 Tropical Architecture in the Humid Zones

"What we can do here in treating the architecture of the tropics is to attempt to arrange what knowledge and

vocabulary we have, and can collect, upon the subject, that will augment, define and perhaps refine the vocabulary that each reader may bring to the creation of new works of architecture” (Fry and Drew 1956: 19).

Fry and Drew’s 1956 manual demonstrates the multiple dimensions of the concept of Tropical Architecture. Above everything it is practical record of the knowledge accumulated by the authors in over a decade of work in Ghana and Nigeria. In this respect it is a kind of treatise in the tradition of Renaissance architects and modern authors such as Gropius and le Corbusier. Like a treatise, the book has a layout that a practising architect might find rather practical. Most of the chapters describe a building type, the House, Educational buildings and so on, reflecting the type of commissions the authors undertook.

In the final section of the book, the authors defer to the technical authority of external sources through the use of various charts, appendices and building research stations, including information to help other architects deal with the physical aspects of tropical building and site conditions. The relationship between this section and the main text raises some questions. It seems to suggest an unresolved integration of scientific processes and data and the work of an architect as it is represented by the main body of the text. It may be that scientific data was unfolding too rapidly for assimilation into design, or that scientific knowledge was fragmentary in relation to architectural knowledge that is arranged around the resolution of the building. Whatever the reasons for its arrangement, it is clear from its inclusion that scientific data is considered a necessary part of the knowledge of tropical architects.

At the same time as it records the authors’ own practice, the manual records a broader world of work, represented by images of buildings by