comforting one. Such images detach architecture from its political and economic contexts, with their troubling content of resistence movements, exploitative labour or environmental despoilment in the production of commodities to trade for buildings. Similarly, the use of children to represent local subjects is ideologically loaded. Read in association with some of the paternalistic statements made by architects[9], such images convey colonial prejudices about Africans who are imagined to be [still] "developing".

3.4 Siting

These texts on tropical architecture establish a methodology by which architects can respond to a site. They should have a general overview of climatic conditions, to know "how the sun falls in the tropics generally, and in specific localities particularly" (Fry and Drew 1956). Once the climate type has been established from the maps, or other sources of information such as building research stations, the specific conditions of the site should be analysed. Fry and Drew call this "siting". "The scientific way of thinking about the problem is to imagine all the conditions and requirements bearing upon it and to decide which are the governing ones." (1956: 50).

It was crucial for architects to site buildings correctly, as failure to do so could make residence in a tropical location unbearably unpleasant

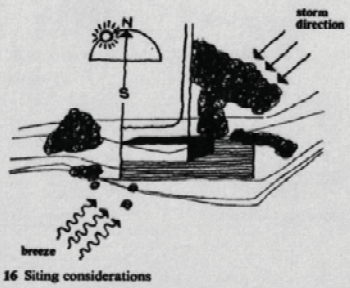
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[9] A typical instance of paternalism is in the multiple references to "the people of the Tropics" as a generic, "developing" group. Elsewhere, especially in interviews, more overtly racist comments are made, such as by Fry (1972). "It [the tropical climate] destroys many materials. Concrete it contracts and expands too quickly. It has this effect on the people too. It expands and contracts them far too much, it makes evil worms that go into them, and mosquitoes that give them diseases and leaves them in a state of lethargy, unable to think clearly to act clearly enough, quickly enough, and so people have got to be considered along with the rest."

for a modern dweller. Framing his concerns as questions, the author of a handbook on *Tropical Houses* (Oakley 1961) asks:

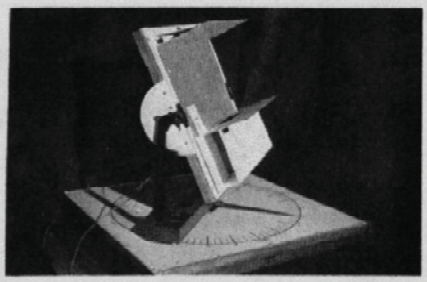
> "Does the site receive and exchange of breezes between land and water body? Is it on an exposed hilltop or in an oversheltered valley which might prove distressingly hot to live in? Is a breeze a requirement for indoor comfort?" (1961: 193)

An image (Fig 3.16) from Fry and Drew's manual (1956: 52) graphically sets out the parameters for siting tropical buildings. This plan view shows a rectangular volume representing the building. It is set amongst lines that indicate a road, planned and existing vegetation, the contours of a slope, the direction of breezes and storms, the shadow cast by the building and the path of the sun. The caption is "siting considerations". In this image, the local qualities of the landscape are limited to those quantifiable elements which can be shown on a plan or section.

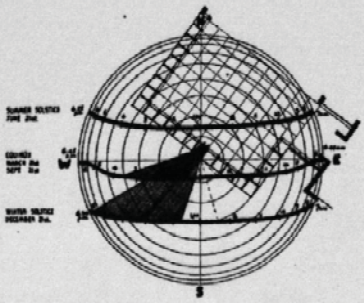


3.16 Siting considerations (Fry and Drew 1956: 52)

Many architects trained in techniques of climatic site analysis, whether in the course on Tropical Architecture or through contact with engineers, began the design process by constructing solar charts for the site. Various approaches to this had been developed by the 1950's (Aronin 1953). The Building Research Station in Britain developed a device called the Heliodon (Fig 3.17) which could be used to project solar paths onto models of building (Foyle 1953). A popular sun chart (Fig 3.18) projected the sun's altitudinal position and angle (azimuth) onto a flat surface, allowing for readings of the sun's path over a site to be determined for different times of the year. Drawn on transparent paper and placed over a building plan, these diagrams could be used to analyse the sun penetration into the building.



3.17 Heliodon (Fry and Drew 1956: 250)



3.18 Solar chart (Fry and Drew 1956: 258)

Godwin and Hopwood were amongst the practices that used empirical measurements such as these early in the design process[10]. Their approach involved the use of solar charts to design sun control devices, noting breezes and views. In their earlier designs they tended not to consider the urban context of the building, siting it instead in relation to the sun.

Practices such as the use of solar charts created a body of knowledge about the site that centred on empirical and cartographic forms of representation. Their transmission, through practical manuals, teaching and consultancies, reproduced this way of seeing. In the process, aspects of the site that resided in other forms of representation were undervalued. It was not surprising that the physical site could at times all but disappear. Such a case is the idealisation of the tropical house.

3.5 Ideal homes: buildings for generic sites

The use of imaginary buildings to illustrate a model that might be used on a number of sites is an interesting practice in Tropical Architecture. In a sense, the images that represent buildings as diagrams or the aesthetically composed images that drift independently of their physical locations are all idealisations of a tropical building type.

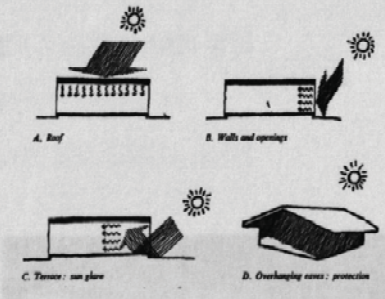
Fry and Drew's text (1956) attempts to systematically elaborate a method for the design of tropical building types. The arrangement of the text of *Tropical Architecture* which treats different building types in separate chapters suggests that the major functions of use are an important consideration in designing buildings. The chapters deal with "The House", "Retail and Commercial Buildings", "Educational

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[10] Interview with John Godwin and Gillian Hopwood, Johannesburg, 2 October 2001

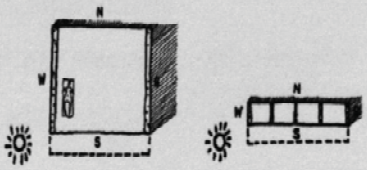
Buildings" and "Health, Hygiene and Hospitalisation" respectively. Within each chapter certain problems common to that type are identified.

In the chapter on "The House" (1956: 50-106) the authors use the house as a case study of a type generated in response to climatic conditions. The first consideration in its design, they propose, is its siting, which is represented in a diagrammatic section. Further diagrams elaborate on the specific factors bearing on the building type, represented as a rectangular box with either a flat or low pitched roof (Fig 3.19). The issues of sun, ground treatment, ventilation, mosquito screening, day lighting, artificial lighting, rain and pest control are all demonstrated. Photographs and plans of exemplary houses from around the tropical zones further illustrate the chapter, with captions and occasionally climatic data given to indicate their location.



3.19 Heat source and protection to the house in the tropics (Fry and Drew 1956: 51)

Through the individual diagrams, and in reference to outside models such as "an imaginary Mies van der Rohe house" and Antonin Raymond's housing for Guam, a typology is built up. This "house of air" has "the walls removed...and a widely over-sailing roof", using "sliding walls of louvres, mesh or glass"; it is "a thing of point supports, a light framework allowing the maximum of openings for adjustable louvres, windows, mosquito screening". It should be set out with short sides to east and west (Fig 3.20), and strung out in east-west rows when used in terraced housing. It could be raised on stilts to avoid ground radiation and benefit from the additional breeze. The chapter avoids prescriptions on the internal planning of the house, acknowledging "the general trend towards informality...in accord with the liberation of the house plan to meet climatic conditions".

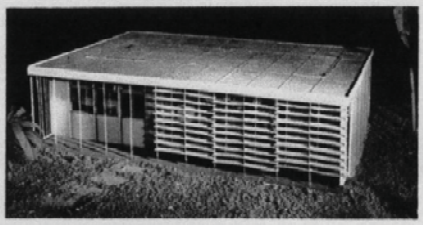


3.20 Arrangement of walls and openings (Fry and Drew 1956: 56)

Fry and Drew's "hot-wet tropical house" type, with its international

referents, open walls and plans, orientated towards the sun and view and raised above the ground, comes close to being a generic international style villa. Its appearance relates to iconic European modernist buildings such as the Turgenhat house, Villa Savoye or the Rietveld-Schroder house. As they point out, in this idealisation, the walls of glass of the modernist villa have simply been removed. The tropical house belongs as much in the abstract space of modernism imagined by western architects as a response to the conditions of West Africa.

The development of imaginary ideal houses has interesting parallels in a prefabricated tropical house produced by a British company. The Cruden Tropical House, produced in 1954 to a design by Douglas Stevens and Partner, with Ove Arup as a structural consultant, was a lightweight kit building with insulated wall and roof panels (Fig 3.21). The windows, double glazed in teak frames, were shaded with horizontal *brise-soleil*. The house, which cost £3 500 with an air conditioner, was intended to "to provide the essentials to civilized living in a hot climate"(Walter 1955: 55).



3.21 Douglas Stevens and Partner, **The Cruden Tropical House**, 1954 (Walter 1955: 55)

The concept of a generic modern house for tropical climates is also a revision of the bungalow, the fundamental residential building in British colonies from the eighteenth century onwards (King 1984).
The design of the modern ideal home with its flat, flush roof did away with the top ventilated, pitched roof and verandah of the classical bungalow. As a freestanding residential building with rectangular proportions, however, it retained a similar footprint.

The modern ideal house, like the bungalow, is dissociated from a specific site. The tradition of raising accommodation off the ground that King (1984: 211) observed in bungalow design is often carried through in the design of the modern house. Similarly, as a social space,

the ideal home is cut off from its neighbours by virtue of the lack of actively used outdoor space around it, and by the segregation of neighbourhoods along racial and economic lines.

The concept of ideal building types was extended to other programmes. Kenneth Scott Associates designed a generic library building in the 1950's that was used at a number of sites including Koforiadua and Tamale (Evans 196-: 72). The design included a structural steel framework that could be prefabricated, and assembled on site with infill panels and high level windows (Fig 2.14). Many housing programmes, such as Cubitt's housing at Kumasi (AJ 1956a), and the Architects' Co-Partnership's housing for Tema (AD 1959) used typical or repetitive plans.

3.6 Conclusion

The development of a discourse involves the construction of a set of statements which delimit what can be known about the world. The repetition of these statements perpetuates the position of privilege from which the discourse draws its authority. In constructing a concept of Tropical Architecture, architects developed ways of knowing the site by defining and acknowledging climatic difference above all other forms of difference. In doing so, they generated modes of representation in which alternative spatialities, whether implicit in specific landscapes or cultural practices, are excluded or erased. In their place, an essentialist construction of the tropical landscape is shown, which was best addressed through western forms of knowledge.

These representative practices have parallels in the techniques of drawing and analysing the site that is reproduced by manuals, education and other professionals. These similarly centre on knowledge of the site that lies in a rationalist tradition and that can be determined empirically. This leads to the development of architectural designs that are entirely independent of the site, including generic houses.

It can be argued that the concept of a generic tropical site is a comforting one, from a

western perspective. These images are used to represent colonial sites in a way that transcends the devastating effect of colonialism on local economies, ecologies and cultures. This absence or dismissal of any signs of local subjectivities, expressed in different building customs, opens this site to western approaches to form making. As the following chapter will show, the effect of this is to erase the remaining traces of difference from sites through the making of buildings.

4. MAKING BUILDINGS

4.1 Outline

This chapter leads on from the previous one by showing how representational practices in climatic design opened the way for building practices that were in effect disembedded from their actual, physical sites. The placement of buildings related to a wider logic of space that was organised in response to the needs of the modern colonial system.

This chapter endeavours to show how the material choices that architects made were often political choices, although this narrative usually remains unspoken. Buildings are the product of broader discourses, certain aspects of which their construction and use reproduces.

This chapter first looks at the ways architects dealt with the actual site in designing and placing buildings. These include strategies which replace the local topography with more level, geometrically ordered or differently landscaped sites, or those which detach the building from its site. It then looks at internal layouts, seeing the space within the building as one which reproduces features of modern western space.

The next section examines the materials, tectonics and compositional approaches that are used to compose tropical architecture. In ways that are similar to practices of siting, these locate modern techniques in a logic of difference. In their material choices, architects in West Africa dealt with conditions that contrasted with the familiar either by trying to make external norms work, or by admitting a limited number of useful non-western approaches.

These discussions intend to link the apparently pragmatic decisions of climatic discourse within the context of the political dominance of the west. Understood in these terms, it becomes clear that climatic discourse privileges certain responses above other possible expressions by valorising certain formal traits. This would imply that certain types of

climatic response have been excluded from the canon. Of all possible forms of climatic responsive design, western architects favoured the reproduction of those that could extend their own cultural discourse.

4.2 Practices of siting in climatic design

In practice, architects place buildings in certain ways on sites to make them relate in geometrical and sequential ways to each other and position their openings to frame views of the landscape. The dialogue between building and site that results is an expression of how architects see their relationship. In that sense, built architecture reflects the sorts of spatial imaginary that images and texts show.

The images of tropical architecture convey senses of detachment, and portray generic sites. The same themes play out in the practices of siting architecture in tropical architecture. This section explores this, looking in particular at examples where architects use climatic response as a justification for certain siting approaches. These begin with practices that conceptually precede building such as town planning and landscaping, in which architects attempt to displace existing land uses to construct a *tabula rasa* for their own designs. It will then look at how architects place buildings within this landscape according to certain *a priori* principles that detach them from the actual site, and how they repeat their form and placement across single or multiple sites.

4.2.1 Remaking the site: planning and landscaping

The actual sites of tropical architecture seldom resemble their images in architectural

media. Modern West Africa was a densely populated region with traditional and modern farming practices working alongside each other. Rapid and unplanned urban growth was already a political concern in the 1950's. Fry and Drew's manual contains images of slums, markets and traditional rural and urban landscapes (1950). (Fig. 4.1)



4.1 Ibadan, Nigeria (Fry and Drew 1956: 22)

Modern architects and town planners regarded these sites as problematic: they were insanitary, chaotic and primitive (RIBA Journal 1948, Home 1997). Planning was a practice deployed to reorder such sites. The governments of colonial and post-colonial West Africa increasingly used professional planners to develop spatial norms in villages and towns. Some planners like Fry and Drew were also architects. In many cases architects worked on sites that had been laid out by planners using modernist principles.

In these cases, the consequences of site planning was to open up sites for architecture that resembled the sort of idealised site captured in media images. Sometimes this involved a literal clearing of existing topography or uses. Planners used slum clearance (parts of Lagos were cleared in the late 1950's and Nima in Accra was removed in the 1960's) and took over village and rural land to create new sites. Land reclamation in Lagos created expanses of flat sites where there had been swampland (Akinsemoyin and Vaughan-Richards 1977). Elsewhere, such as the site of Prempeh college outside Kumasi which was agricultural land donated by the Asantehene (Oase 1999), land was donated by local leaders.

Maxwell Fry and Jane Drew practised as planners in the Gold Coast from 1944, before their first architecture commissions, and their manual on the subject of village planning (Drew 1947) refers to climatic thinking. In it, they promote practices of de-densification in

order to create belts of fresh air between buildings.

In executing their commissions for the campuses of the universities at Ibadan and Kumasi, Fry and Drew and James Cubitt and Partners used the opportunity to plan both the setting and its architecture. The siting of the groups of buildings was influenced by climatic conditions, as the architects chose sites where buildings could easily be placed to face north and south, towards the breeze and away from east and west sun.

As a whole the campus at Kumasi sprawls over an undulating site of over five kilometres wide with a stream through the middle (Fig 4.2). In their description of the project the architects confess to their eurocentric approach: "Landscaping was one of the first things we considered, perhaps by this confessing ourselves very English" (AR 1956:230). They refer to the "parklike" European quarter in Kumasi and the agricultural station at Aburi with its "specimen trees from the tropics - teak and cocoa plantations, great clumps of spidery bamboo and sisal bushes" as models for this. Their description of the 'acropolis' of main buildings and to the campus's resemblance to South American projects extends their field of reference historically and geographically. The site is seen to be anywhere but in Africa.

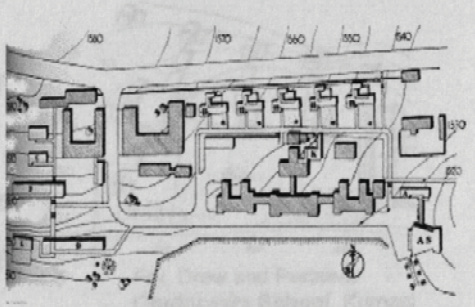


4.2 James Cubitt, model of **University campus, Kumasi** 1951 (Kultermann 1963: 97)

4.2.2 Repetition and separation as practices of detachment

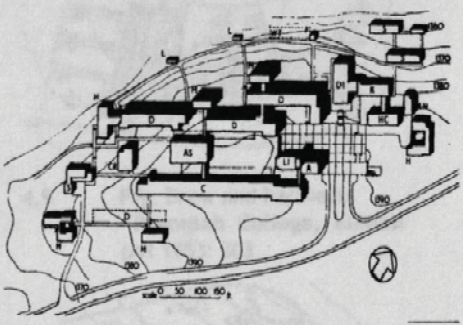
One of the most powerful indicators of the attitude of modern architects in Africa towards their sites is the use of repetition in the placement of buildings. In practice, modern architects in West Africa designed similar buildings for different sites, or repeated similar parts of a complex of buildings across a large and topographically varied site. These practices of siting relate to spatial practices within

colonialism. For instance, the repeated appearance of certain building types between countries is the consequence of the repetition of standard procedures in colonial systems such as education or banking.



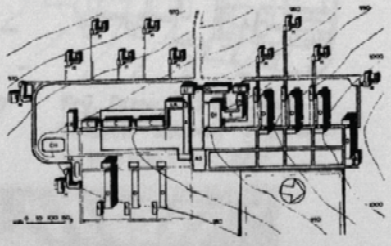
4.3 Fry, Drew and Partners, **Teacher training college,** Akropong, 195- (AD 1953: 301)

The strategies of repetition and standardisation used in West African design drew from the programme of rationalisation that was central to modernist architecture in the West. Learning from mass production in industry, modernist architects attempted to rationalise building production to create economies of scale. This process depended on a rational development of standard types that would suit multiple sites, an approach that in turn depended on the establishment of an ordered society (Frampton 1992).

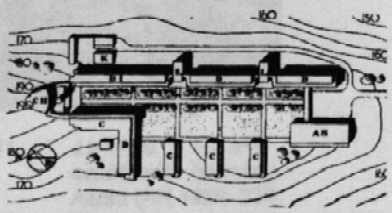


4.4 Fry, Drew and Partners, **Aburi Girls' School,** Aburi c 1951(Fry and Drew 1956:210)

Maxwell Fry and Jane Drew's built work frequently repeated responses to climate. From 1946 onwards their work on schools in Ghana involved designing and testing designs for arrangements of classrooms, dormitories and staff houses that would work on a number of sites (AR 1953). They used one of two approaches to siting: at Akropong, Aburi, Mawuli, Wesley and St. Andrew's (Fig 4.3 - 4.7) the blocks of classrooms are aligned to face north and south; at Opuku Ware, Prempeh and St Francis (Fig 4.8 -4.10) their orientation varies with their long axes parallel to site contours, but the standard types of buildings are repeated in the design.

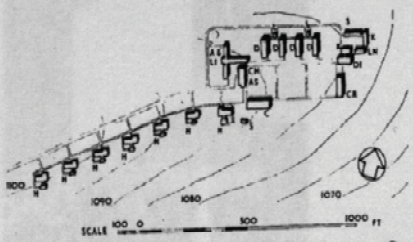


4.5 Fry, Drew and Partners, **Mawuli School,** Togoland, c1950 (AD 1955: 144)



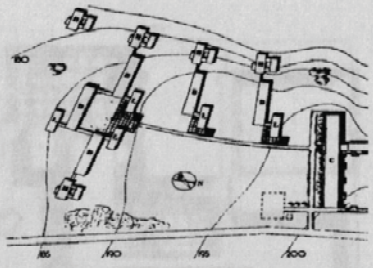
4.6 Fry, Drew and Partners, **Wesley Girls' School,** Cape Coast, Ghana, 1950 (AR 1953:304)

One strategy that Fry and Drew used recurrently was to site the buildings on high land where breezes were more prevalent. The blocks were generally a single room deep with an access corridor. The orientation usually placed the window wall towards the south or southeast towards the breeze. On coastal sites this orientation meant that windows looked towards the sea.

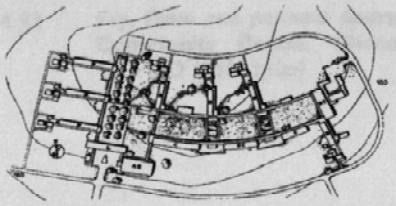


4.7 Fry, Drew and Partners, **St Andrew's College,**Mampong, Ghana 1948 (AD 1955:141)

In all the projects the architects analysed three factors - the fall of the land, the direction of the breeze, and the sun path - with one of these selected as the dominant condition in siting the building. Despite the differences between sites most of the building typologies were very similar in form. A block of a single room depth, flanked on one side by a walkway with a patterned balustrade and by vertical and horizontal fins to shade the windows on the other side, became the norm for classrooms and dormitories. These blocks varied between projects from one to three storeys in height but seldom differ in the same project.

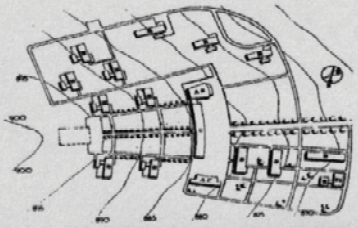


4.8 Fry, Drew and Partners **Opukuware School**, Kumasi 1951 (AR 1953: 310)



4.9 Fry. Drew and Partners, **Prempeh College**, Kumasi (AR 1953: 303

In some of the designs, the blocks are mirrored, placing corridors to the north and south or even to the east. At Wesley and Aburi Girls' Schools, which are sited on the crest of a ridge, the corridors are switched between facing blocks to make all the circulation flank the quadrangle, an arrangement which allows for views from the classroom windows.



4.10 Fry, Drew and Partners, **St. Francis School, Togoland.** C1950 (AR 1953: 302)

It was common practice to use similar repetitive planning approaches for housing projects. In their first project in Accra, James Cubitt's practice devised two designs for twenty houses for planning officials (AR 1956: 238-9). One is a courtyard type that opens in part to a shaded patio (Fig 4.11), and the other is double storeyed with a porch created below the upper floor (Fig 4.12). These aspects of the plans allow for a small area of the outdoor, rimmed with plants, to be constructed within the envelope of the building. This partially autonomous place, with its climate modified by shading devices and specimen vegetation, both resembles and improves on the larger site.



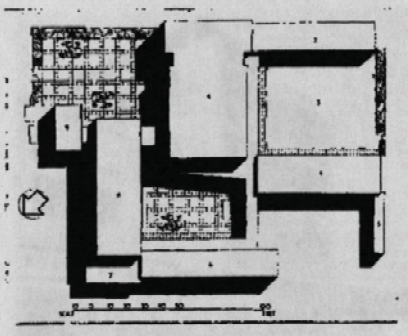
4.11 James Cubitt, **courtyard housing**, Accra (AR 1956: 238-9)



4.12 James Cubitt, **double storeyed housing**, Accra (AR 1956: 239)

Fry and Drew also used courtyards. Since this type of plan potentially obstructed cross ventilation, they were careful to form these

between raised blocks that ran in an east to west direction and colonnaded walkways from north to south. An early example is the Accra community centre (Fig 4.13), and they were to use courtyards extensively in the plan for the University of Ibadan (Fig 2.13). The interior of these courtyards was manicured lawn that resembled English colleges.



4.13 Fry, Drew and partners **Accra Community Centre**, Ghana 195- (AD 1955: 140a)

Cubitt's arrangement of buildings at the Kumasi College of Technology (AR 1956: 230) also mixed strategies of repetition and place making. The numerous buildings in the Kumasi campus are grouped in functional clusters. Similar types such as housing or lecture blocks are repeated and placed in a series or mirrored.

Strategies of repetition allowed for the administrative aspects of the building production to be rationalised, as the architect has to design only a typical block which the builder produces in multiples. The planning of the site as whole becomes an issue. In the compositional approach to siting that many architects used in West Africa, the spaces between the buildings are significant as intervals, rather than in a positive sense. They are used to "space" repeated units according to norms, and to establish hierarchies between different forms and uses. Often the in-between spaces are not physically rendered by the plan. The actual site, with its vegetation, textures, topography and signs of habitation is simply material for the production of the planned site that is placed over it and which, in effect, partially erases it. Physical interventions such as levelling land and clearing vegetation that literally remove unwanted site conditions make this attitude manifest (Fig 4.14).



4.14 Site levelling. James Cubitt and Partners, **Engineering Block, KNUST**, Kumasi, 1955 (Atkinson 1953: 16)

If the repetition of the buildings between and across sites creates an effect of them being detached from their context, some of construction details reinforces this appearance of separation. The

industrialised appearance of most of the modern buildings sets them apart from the settings. As clean, white, crisp edged constructions they differ from both indigenous architecture and older colonial styles. They seldom have materials, shapes or colours in common with their natural surroundings and where they are, their use is mediated by a framing system. In urban contexts the scale of modernist buildings, as a whole and in their details, is quite different



4.16 Fry, Drew, Drake and Lasdun **Leventis Store**, Accra c1952 (AR 1955: 167)



4.15 Godwin and Hopwood, **Offices for Allen and Hanbury's**, Lagos 1956 (photo Godwin and Hopwood)

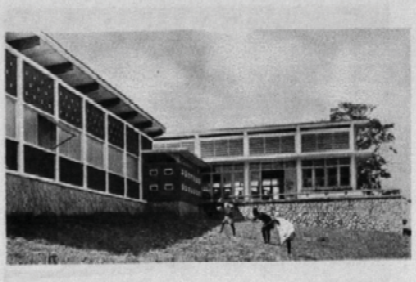
from the colonial fabric (Fig 4.15, 4.16).



4.17 Fry, Drew and Partners, **Akropong College**, Ghana (AR 1953: 301)

In the colleges at Akropong (Fig 4.17) , Aburi (Fig 4.18) and Adisadel, designed by Fry and Drew, local stone plinths were used to take up the differences between ground level at the ends of the buildings and in the landscaping of the pathways linking buildings.

While this use of local materials might be read as a gesture that establishes a connection with the site, it seems more likely to be a



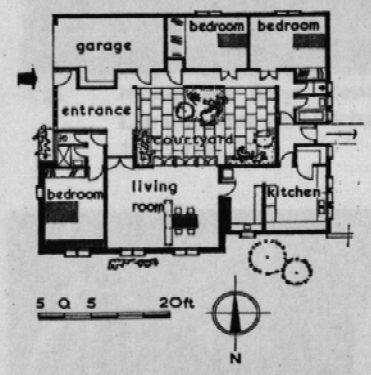
4.18 Fry, Drew and Partners, **Aburi Girls School**, Ghana, c 1951 (AR 1955: 153)

decision based on the scarcity of alternatives. Since bricks and reinforced concrete were usually imported and expensive to transport, local stone was used where possible for the mass walls involved in the building bases. In the treatment of these stone walls, with tidy granolithic toppings and edging balustrades, the relationship between the building material and the natural site is shown as unambiguously separate.



4.19 Fry, Drew and Partners, **St. Monica's School**, Ghana c 1951 (AR 1955: 166)

Fry and Drew's use of local stone in wall panels, such as in the assembly hall at Opoku Ware and St Monica's school, and at the University of Ibadan also appears contained and decorative (Fig 4.19). Similar strategies are used with respect to vegetation. Although many designs include planter beds or pots for small ornamental gardens, and specify trees along roads, clear edging to the planter beds and zones of grass and paving adjacent to buildings are used to demarcate and confine the growth of planting to manageable areas (Fig 4.20).

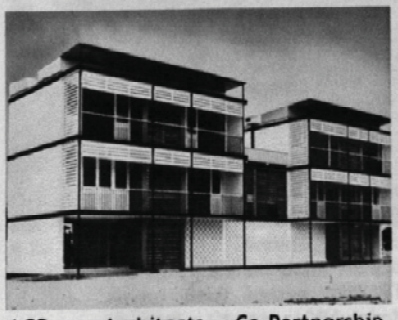


4.20 Fry, Drew, Drake and Lasdun, **House at Wudil TeachersTraining College**, Nigeria (Oakley 1961: 55)

In some cases, architects introduce a neutral area between the building and its sites to indicate a clear separation of built materials and functions from their surroundings. Godwin and Hopwood frequently used gravel around the base of the building to set it apart (fig 4.23). In several houses designed by James Cubitt (fig 4.12), Kenneth Scott (fig 4.21), Fry and Drew, and the Architects Co-Partnership (fig 4.22, and institutional buildings such as the Architecture School at Kumasi by Hobbis (fig 4.24), the central library by Nickson and Borys (fig 4.25) and the police headquarters by Kenneth Scott (fig 4.26) in Accra, the closed accommodation is raised on *pilotis* to first floor level. The climatic reasoning is that at this level the cooling breezes on the site are likely to be more regular than on the ground. The space below, with a concrete surface bed, is used as an entrance hall, utility spaces such as



4.21 Kenneth Scott **House**, Accra c1955 (Kultermann 1963: 152)



4.22 Architects Co-Partnership, **Houses**, Lagos (Kultermann 1963: 154)

laundries, garage areas or in some cases, as the site for servant's accommodation. While the upper floors of the building and its inhabitants are clearly detached from their physical context, the space below houses people and functions that belong in both realms.

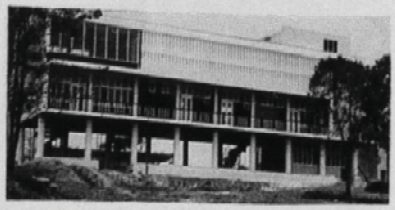


4.23 Godwin and Hopwood, **Northern Police College**, Nigeria 1961 (photo Godwin and Hopwood)

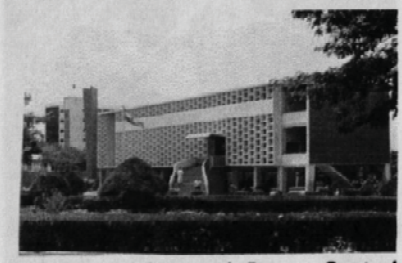
The design of space for cooking which often takes place outdoors in West Africa was a particular concern in housing with servants and for African workers. At Kumasi campus, most of the houses include a kitchen yard that is discreetly contained by a high wall pierced with ventilation holes (Fig 4.27). As a site for local practices, the yard is included but becomes concealed within the boundary.

4.3 Building forms

4.3.1 Internal arrangements



4.24 Charles Hobbis, **Architecture School**, KNUST, Kumasi, Ghana 1957 (Richards 1961:110)



4.25 Nickon and Borys, **Central Library**, Accra 1957 (Richards 1961: 110)

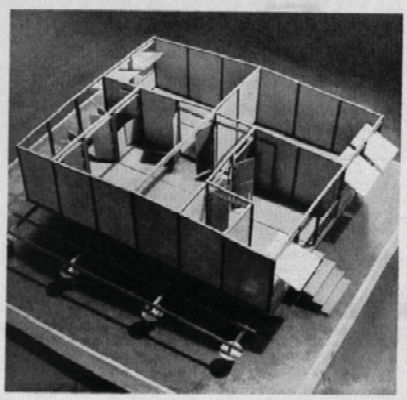


4.26 Kenneth Scott, **Police Headquarters**, Accra 1958 (Kultermann 1963: 17)



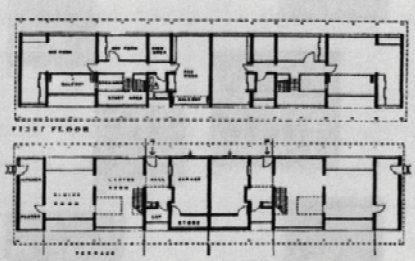
4.27 University Planning Office (design architect John Awuso-Addo) **Staff house, KNUST**, Kumasi, Ghana c1964 (photo Hannah le Roux)

Just as the spaces formed between and alongside the buildings of Tropical Architecture were treated as intervals, or other worldly spaces, the interiors of these buildings had particular qualities. These interiors were designed using technologies and spatial patterns which were rooted in the west, but they had to respond to different qualities of light and views of their surrounding context.



4.28 Architects Co-Partnership, **housing for Volta River Project**, Ghana 195-. Concept model (Danby 1963: 33)

The design of internal space in most of these buildings draws on a number of principles which lie in a rationale of efficiency. The use of repetitive structural systems such as concrete columns and beams allowed a certain amount of freedom in the layout of internal walls, although these were usually laid out on an imaginary grid (Fig 4.28). The rectangular geometries that result allow architects to specify repetitive elements like window modules, or prefabricated partitions. Open plan spaces, used in the reception areas of houses and public buildings allow the number of internal walls to be reduced and spaces for circulation become part of the overall volume.

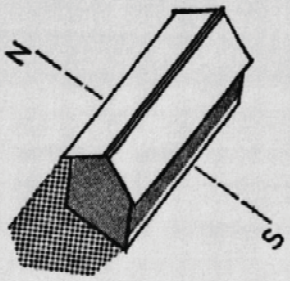


4.29 Plan with single room depth. Architects Co-Partnership, **staff housing**, Nigeria 1957 (*Architect and Building News* 1957: 709)

Concepts such as open planning were developed in the west to increase the amount of light within the building. In Europe, modern architecture was characterised by well lit interiors, that contrast to the dark spaces of traditional architecture, obtained by the use of expanses of glazing to let the sun in. In West Africa, where sunlight was more readily available, architects had to achieve similar qualities of internal space by filtering the light and by introducing cross ventilation (Fig 4.29). By reducing light and heat penetration the architects made the indoors less like its actual context and more like the cooler, bright spaces of the modern architecture of the European metropolis.

Within these schemes, the interior stands in contrast to its surroundings. Its geometry and internal climate mark it as a space

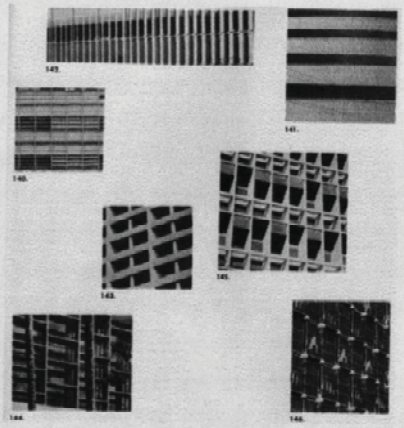
that is essentially modern, set into a context that is essentially tropical. The encounter between these contexts lies within the boundary of the building. The building envelope, as a filter between the external environment and as a formal reflection of internal arrangements, can be read as boundary between different orders. For some architects, the concern was to articulate this encounter in expressive ways.



4.30 Building orientation (Oakley 1961: 97)

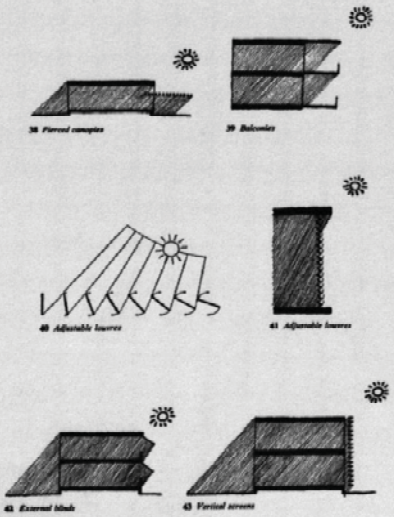
4.3.2 Building envelope

Many tropical buildings are rectangular boxes with two long and two short facades and a flattish roof (fig 4.30). The short facades, usually facing the west and east, were often solid walls to shield the building interior from the sun. The flat or monopitched and low roof gave a horizontal frame to the building composition. The final two long facades were designed as functional devices which gave a strong formal order to the building. In many of the texts and designs for tropical architecture, architects put a special emphasis on the issues that the long building facade needs to resolve. It is used simultaneously as a mechanical device, a filtering element, and an expressive device. As the following chapter outlines, these long facades included a variety of devices to control the sun.



4.31 Comparative images of facade treatments (Olgyay 1963 :64)

The building envelope, and the facade filtering the sun in particular, is often seen in professional literature like journals and text book as an element in its own right. One common representation, a comparative set of images of facade treatments, shows the techniques and effects of sun control (Fig 4.31). Another frequent image is the diagrammatic section that shows the penetration and control of air, light and heat into the building interior (Fig 4.32). These representations privilege the building envelope which is shown



4.32 Diagrammatic sections (Fry and Drew 1956: 67)

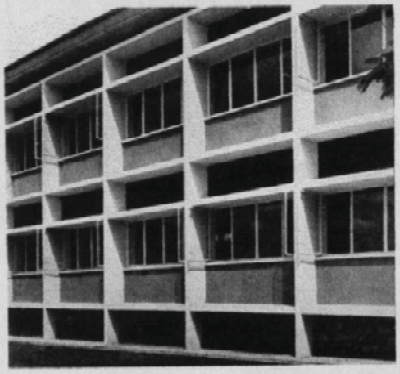
as a complete system or solution, isolated from other aspects of the building's design. In many cases this type of image is the only representation of the building in that particular text.

The sun control devices are often used decoratively. As Olgyay's summary (1963: 65) of the *brise-soleil* treatments in hot and humid climates shows, the manipulation of sun and shade had intrinsically formal effects.

> "Some patterns let the air movement through, and provide shade with more or less privacy. Some use the wind to cool the wall and defend it by half shade. Patterns might be geometrical or use the fluid play of the *claire-obscure* of the light. This can be horizontal by ingenious utilization of spatial constructions. The shading elements of elevations in combination with the deep balconies provides rich texture. Horizontal devices can be closed in character, but nearly similar shading effect can be reached with butterfly-light balconies. Some orientations call for vertical shading members with movable or with fixed fins which dominate the appearance of the elevation. In certain locations the eggcrate sun-breaker provides the necessary coolness by screening before the glass, or by creating with twofold depth the elevation itself."

The structural approaches that architects chose for the building was related to the nature of the sun control device. This could be combined in a load bearing wall, perforated with openings, although this was not usually the case. Most of the buildings rely on a regular framing system to provide support between panels of lightweight materials that deal with sun control. This created an ordered horizontal and vertical array of textures, solids and voids.

With the involvement of creative engineers like Ove Arup the structural frame itself could become a strong decorative element. In the work of Fry and Drew at Ibadan and some of the schools in Ghana, concrete piers between and above window openings project outwards from the building to create shade. (Fig 4.33).



4.33 Fry and Drew with Ove Arup, consulting engineer Ibadan **University Administration Block** Nigeria 1951. Projecting concrete piers in facade (AD 1955: 157)

4.3.3 Materials

The division of the facade into structural elements spaced with climatically responsive infill panels relied on the availability of materials that had sufficient strength to carry loads between bays. Architects commonly specified reinforced concrete for this, although some steel and timber, the materials used for earlier prefabricated buildings in the British colonies, were still used on occasions. The availability of reinforced concrete was fairly limited in West Africa in the 1950's. Steel was imported. King (1984: 218) notes that the use of imported cement rose dramatically after 1945, from 100 000 tons in 1947 to eleven times that amount by 1967. Costs were relatively high: in 1960, Nigeria imported over 600 000 tons of cement at twice its British market cost. The demand made local manufacture viable and the West African Portland Cement company was set up in 1957.

Most of the buildings that Fry and Drew designed used cement block walling in a reinforced concrete frame, with the roof structure from timber rafters carrying asbestos cement sheeting, or in remote sites, corrugated aluminium. They were aware of some of the problems such as the cost of introducing concrete as a material. They justified their decision to use concrete structures and concrete block walls in terms of the unavailability of alternative materials in Ghana in the late 1940's:

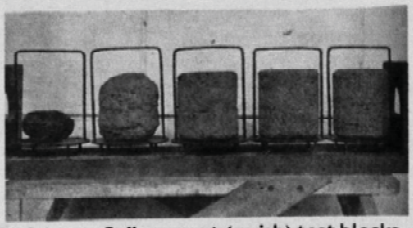
> " Burnt brick and tiles are rarely used in a country with

none other fuel than its precious forests. Good stone occurs infrequently; slate is unknown; timber is rapidly consumed by termites, and at the end of the war no seasoned stock remained." (AR 1953 300).

The promotion and use of imported materials should be seen as an exclusionary practice within colonial discourse. The importation of goods from metropolitan centres was in the economic interest of the west, and practices which associated modern materials with economy, rationalisation and comfort helped to expand the market. Moreover, modern materials could fit into western practices of making spaces, whereas local alternatives were unthinkable within the colonial apparatus.

> "Now we looked round and there was no traditional architecture to go on, because African villages are made of mud and thatch and they are renewed annually and they suited their conditions very well, but the new conditions were quite different, there was a cash economy, there were annual budgets - it wouldn't do, we had no means of repairing every each school by rite and custom every year. So we had to look round and use the materials such as we could find." (Fry 1972)

The development of alternative technologies that used locally available materials was fairly limited. One area of experimentation was in the development of cement stabilised soil, called "swish" or "swishcrete", in Ghana (Atkinson 1950: 318), as a material for the walls of workers' housing and village schools (Fig 4.34). As a cast material without tensile strengths however, this was unsuitable for large flat spans and was not generally integrated into the vocabulary



4.34 Soil-cement (swish) test blocks, Gold Coast Town and Country Planning Board Laboratory (Atkinson 1950: 318)

of prestigious institutional buildings[11].

Local stone was used in a number of buildings. At Ibadan University, rough blocks of stone were packed in panels adjacent to surfaces of smoothly finished cement block work and reinforced concrete (Fig 4.19). The appearance of the material was exploited to express contrasts, with its rustic, textural effect set against modern and internationally used materials.



4.35 Architects' Co-Partnership, **workers' housing for Volta River Project,** Akosomnbo, Ghana 195 (Danby 1963: 8)

Fry and Drew like other architects specified painted timber for a number of applications including adjustable louvres and doors. The Architects' Co-Partnership used timber in at least two structural applications. Workers' housing made from timber frames and cladding was built for the Volta River project in Akosombo (Fig 4.35), and a more elaborate house for officials of Shell and British Petroleum using timber as a structural element was built at Enugu in Nigeria.

In texts describing building materials, architects are quick to point out the unique problems that the tropics present to typically western choices. In Lagos, flat roofs were banned since the stagnant pools of water that lay on them were breeding grounds for mosquitoes[12]. Fry and Drew's book lists the performance of building materials such as metals, glass, concrete, plastics and paints in an appendix to their book (1956: 274-277). Apart from termites eating timber, infestation

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11 In the 1940's, engineers and architects in Francophone West Africa, using forms drawn from traditional architecture, developed designs that used stabilised earth blocks laid in parabolic arches to create larger spans (A d'A 1945). Although earth was used for simple buildings, the only instance of the use of this technology in British West Africa is in the project for the University of Nigeria at Nsukka (AR 1959a)

12 To get around this, Godwin and Hopwood managed to simulate the appearance of a flat roof by using wide concrete gutter beams around the base of low pitched roofs. Interview with John Godwin and Gillian Hopwood, 2 October 2001.

by other insects and various forms of decay caused by fungal growth, corrosion, heat or "fatigue cracking" are common.

Although concrete set in tropical conditions, it did not work well as a barrier against environmental extremes. Early experiments with concrete roofs caused problems. At Wesley Girls School by Fry and Drew, the flat roof re-radiated heat into the building. The roofs of the staff housing at Kumasi by Cubitt Scott, which used hessian and bituminous paint as waterproofing, failed because they leaked and were replaced with pitched sheeting[13].

The anxieties that architects had about materials lasting as they did in the west were allied with their observations of the different aesthetic effects of tropical conditions. The bright sunlight created "glare" (Fry and Drew 1956: 66) and needed to be modified by the building's envelope, through thoughtful positioning of openings and the use of reflected rather than direct light, as well as by the use of surrounding vegetation. At the same time this sunlight gave unique opportunities for expression, either in the "chiarascuro" effects of shading devices and textured surfaces, or in the different intensities of colour. Fry and Drew noted that colours on shaded surfaces had a particularly lasting and glowing effect, and recommended "strong, cool" ones such as a pale, viridian green to give a sense of coolness (Fig 4.36). The "chemical" colour would oppose the natural green of foliage, giving "a contrast full of suggestion" (1956: 253).



4.36 Colour in the work of Fry and Drew. **Opokuware School**, Kumasi, 1951 (photo Hannah le Roux)

These material choices in tropical architecture were bound up with binary thinking about western and tropical essences. The western elements, whether materials or more ephemeral qualities such as light are normalised in such discussions. Where they fail in the

[13] Interview with Prof. John Awuso-Addo, Kumasi, Ghana, 31 January 2001

tropics, their behaviour is represented as abnormal, corrupted by climatic or biological evils. In this thinking, the strengths of the west are technological while the tropics possess an abundance of natural life, including vegetation. In this last respect, tropical architecture draws its unique forms of aesthetic expression from techniques of contrast which narrate the oppositional strengths of the western building and African nature.

4.4 Expressions of encounter

4.4.1 African Motifs

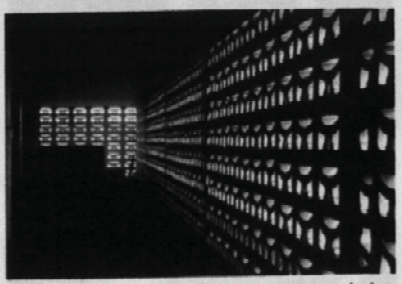
Narratives of tropical architecture present the tropics as a place where the abundant natural forces pose a challenge to the task of modernisation. While many techniques of siting, planning and constructing buildings intend to overcome the context, there are cases where its qualities are harnessed in expressions of contrast. In these expressions, local artefacts and qualities are seen as bold and vital, in opposition to the rationality of the western content.



4.37 Adrinka cloth from Ghana (photo Hannah le Roux)

The inclusion of African elements is often expressed visually. In many cases, motifs are used in the patterning of wall surfaces. In this respect, the use of these patterns is compatible with western conceptions of the wall as a decorative and expressive surface.

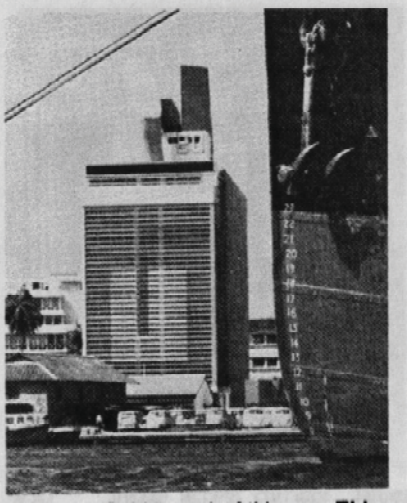
Fry and Drew often based the design of breeze blocks on symbols such as Ashante stools or masks. These symbols were then used in the same way that they would have appeared on Adrinka block prints, repeated in rows or grids (Fig 4.37). At Opuku Ware, for instance, the side wall of the assembly hall is composed of blocks with a stool motif (Fig 4.38). This panel invokes the metaphor of fabric within



4.38 Fry, Drew and Partners, brise block wall to hall at **Opokuware School**, Kumasi, 1951 (photo Hannah le Roux)

both western and Ghanain aesthetics, an ambivalent metaphor which in some ways breaks down some of the binarism that is otherwise implicit in this gesture.

The offices for the Elder Dempster shipping company in Lagos designed by Cubitt and Atkinson (Fig 4.39) have large, organic elements juxtaposed onto the roof and lagoon facade of the rectangular building frame. These forms mediate their African influences through a process of abstraction that is commensurate with western practices of the time.



4.39 Cubitt and Atkinson **Elder Dempster Offices**, Lagos 1965 (RIBA Jnl 1977: 249)

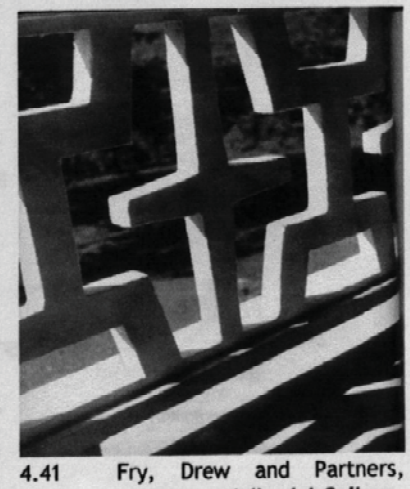
Such expressions coincide with a period of exploration in mainstream western practice of alternatives to industrialised aesthetics. As exemplified by the shifts in the work of le Corbusier, the regular shapes and smooth finishes in the work of many designers were replaced by a more organic aesthetic by the 1950's. In British practice the concept of "picturesque informality" was promoted by the editors of *The Architectural Review* (Frampton 1992: 262).



4.40 Gordon Cullen, illustrator. Frontispiece image of work by Fry, Drew and Partners. (AR 1953)

Fry and Drew's work in a 1953 edition of the journal is represented by the editors to support this concept. The frontispiece is an image by Gordon Cullen that shows a building in asymmetrical perspective set behind a collage-like composition of exotic leaf shapes, the sculptural forms of a sun grille, and a girl in a patterned dress shown in silhouette (Fig 4.40). The blown up image of a sunscreen (Fig 4.41) that follows has a caption that suggests that a mingling of functional agendas, African vernaculars and expressive narratives has taken place in the design.

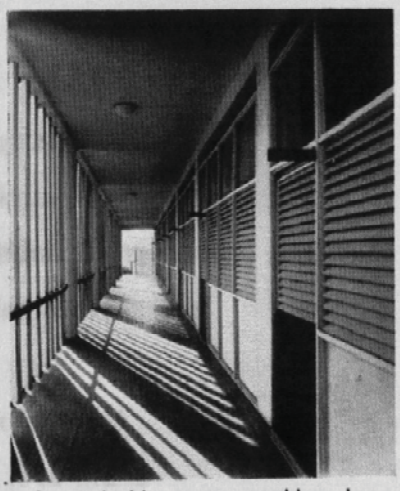
> "Whatever memories of African sculpture, or of vernacular sun-breaking grilles, may have gone into the designing of this balustrade detail from Adisadel College extension, its bold exploitation of the strong



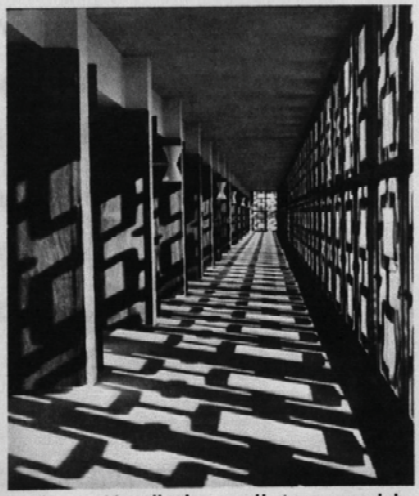
4.41 Fry, Drew and Partners, sunscreen, **Adisadel College**, Cape Coast, Ghana 1951 (AR 1953: 298)

sunlight, by means of its white faces and terracotta edges, is typical of the inventive way in which Fry, Drew and Partners, whose West African work is described below, have faced the challenge of tropical conditions" (AR 1953: 299).

The Architectural Review's images mark a concern that goes beyond functionalism. Like many other representations of tropical architecture in books and journals they pick up on the abstract visual effects of certain material and tectonic choices. Like the photographs of patterned sunscreens taken from within buildings (Figs 4.42, 4.43) that are often used, these images represent the synthesis of (western) functionalist and (primal) aesthetic qualities in tropical architecture.



4.42 Inside access corridor. James Cubitt and Partners, **IDC offices**, Accra 195 (AR 1956: 236)



4.43 Ventilating wall to verandah, Fry, Drew and Partners, **University College library**, Ibadan, Nigeria 1951 (AD 1955: 138)

The use of abstraction reflects the relationships between architects and the visual arts. There is a suggestion that the rational knowledge of sites was not sufficient and that art could compensate for this absence. James Cubitt, whose partnership with Fello Atkinson gave him access to extensive technical knowledge of tropical building, began to do sculpture "to improve my architecture and for itself if successful" in 1957 (Emanuel 1994: 211). Jane Drew wrote of her influential friendships with artists like Ben Nicholson, Henry Moore, Barbara Hepworth, Eduardo Paolozzi and Lynn Chadwick who had been part of the British post-war movement in abstract art (Emanuel 1994: 245).

The connections with abstract art reinfused tropical architecture with elements from outside the western canon. Inspired by the "primitivist" forms of artists like Picasso, who had used the shapes of African masks and figures in his work, abstract art sought to capture and narrate the humane values of less materially developed societies. Through this, abstraction could reconnect the west with its own

archaic values that had been repressed by development (Rubin 1984).

Used in the context of West Africa, however, abstraction becomes an approach that also produces effects for local users. Its impact, as Fry and Drew allude, is intended to have a therapeutic effect on "developing" users who are caught between traditional and modern worlds. Their approach intends to create a "definite and artificial" order with positive effects:

> "inasmuch as architecture is a setting for a way of life, this influence [of architectural order], which enriches the aesthetic and attaches it to life is good" (1956: 253)

The claims made for abstraction by architects such as Fry and Drew are grandiose. They see architects not only as agents but as creators of "civilisation" as they capture and express spiritual values. These values lie in the "causes" of traditional architecture rather than in a vocabulary of fixed forms or building types, and easily overlap with those of the modern west, as in their example of the "open plans" that exist within Indian and African housing compounds. To get to these values and absorb them in a creative work requires "deep and sustained feeling". (1956: 253)

The suggestion of absolute authority at the heart of this definition of the architect is troubling. Not only possessed of technical superiority by virtue of scientific knowledge, the architect can also feel and direct the spiritual essences of other cultures. In this definition, encounters with difference serve to nourish the architectural vocabulary of the west.

4.4.2 Borrowed practices

While the practice of borrowing from building practices outside the west is acknowledged within western aesthetics, its significance is played down in discussions of the technical forms that constitute Tropical Architecture. At the 1952 Conference on Tropical Architecture Johnson-Marshall notes that "It is interesting, *incidentally*, to see that several of the characteristic forms of modern European architecture, ie the piloti, the cantilevered

balcony, the brise-soleil etc. have been used for centuries in the Tropics" (Foyle 1953: 23). The "incidental" discourse of indigenous knowledge is marginalised to a few examples, mis-named, vaguely historicised and stripped of any particular authorship, in contrast to the clear attribution of modern architectural designs in the same proceedings.

King (1984) has recorded how elements of the bungalow, such as its raised floor, ventilated roof and wall evolved from vernacular building practices in the colonies. The professional literature of tropical architecture notes a number of indigenous practices (Atkinson 1952, Fry and Drew 1956, Olgyay 1963) which might carry lessons for modern architects working in hot climates. Many of these practices were transmitted through colonial networks to quite distant locations. For instance, Goodwin (1943) notes how the "jahli" of Indian architecture became "jalousies", adjustable louvres in sliding panels found in South and North American architecture.

It would be difficult to identify in a definitive way which West African vernacular practices directly entered into the vocabulary of modernism. The timber housing by the Architects' Co-Partnership (Fig 4.35) uses the material in a similar way to village buildings in Ghana. There are no references, however, to the transfer of this approach in the associated texts. The design proposal by James Cubitt and Partners for University of Nigeria at Nsukka (AR 1959a) uses "pressed local soil, treated with a protective silicone solution", but the article does not make any connection with the widespread local examples of similar technologies.

Many local technologies that deal with climate are excluded by these practices. By virtue of their temporality, or the agent who performs them, some may have been invisible to architects trained in the west. In other cases, the embeddedness of a form or practice renders it irreducible to an essence that can be absorbed in a modern, western language. There is no doubt that climatic discourse allowed western aesthetics to expand. This expansion, however, is bound by certain formal tendencies. In as much as it is seen exclusively through western eyes, climatic discourse perpetuates difference.

4.5 Conclusion

The material choices in tropical architecture are often political, but this narrative is unspoken. By favouring certain approaches above others, climatic responsiveness reproduces practices that sustain and expand colonial interests and modernity.

An outline of these strategic choices can be determined by examining the forms and layouts in a range of significant commissions, including educational and commercial buildings and housing, undertaken by British trained architects in the tropics. In siting these buildings, architects reified the representational practices that showed the tropics as a singular and different space. Practices of planning, landscaping and reshaping the site erased local qualities. The repetition of buildings within sites, or between different ones, served to disembed them from their locality. The use of pilotis raised buildings away from the ground.

The interiors of these buildings reproduced the spaces of western modernism. The building facade was designed to mediate between these and their sites. The materials that were chosen, notably concrete and steel were generally imported. The use of local materials was unthinkable within climatic discourse, except where, as in the use of stone, it could be framed as a textural contrast with modern elements.

Such practices were typical of binarist thinking in which rational modern, colonial norms were contrasted with the vital, primitive qualities of the tropical. This binarism underlies descriptions of how materials failed in West Africa, and in the choices of colour and light effects. It is used as an expressive theme, as western architects absorb the influence of their artist colleagues in the use of abstraction as it works to capture and express the vitality of some primitive tropical artefacts.

In their negotiations with practices and sites outside the west, modern architects played down or entirely missed the richness of indigenous responses to climate. Where it seemed to augment western practices, by virtue of its contrast, they absorbed the forms of non-western practices into their discourse, while stripping them of their cultural and lived dimensions.