harmony so that pale yellow, pale orange, deep red and deep violet would be thought to look well together. The reverse would look unnatural and discordant. Yellow as a shade becomes deep olive, orange becomes brown, red becomes a strong pink and violet becomes lavender. While the first range may not be to everyone's taste the second would appear discordant to most.

For the urban designer it is the harmony achieved with modified hues together with the harmony of the dominant tint which is of particular importance. The environment in general and the city in particular is made up of modified colours masked by atmospheric tints associated with the time of day and the particular season. The colours found in the city rarely approximate to pure colour and when such colours appear they are normally small highlights, the bright red pillar box, the Algarvian blue trim around the doors and windows of the traditional home, or the brightly painted doors of the sombre Victorian terrace. The natural building materials, such as stone, brick and earth tend to be modified and subtle hues. It is to the environment that the urban designer often turns for ideas, and the natural environment in general consists mainly of the more subtle colours.

The world of colour as a scientific phenomenon consists of a limitless and infinite number of different colours. Judged in terms such as wavelength, luminance and degrees of reflectance there are literally millions of colours. There is a great difference between this scientific world of colour and the experiential world of human sensation. Colours distinguished by the eye are limited to less than a few thousand. In terms of the pure light of the spectrum the eye cannot distinguish more than 180 different hues. Using dyes or pigments still fewer would be distinguished. However, when spectral colours are modified with white, black or grey a whole new series of colours become distinguishable as, for example, pinks, browns and navys.

The eye does not respond to stimulation like a scientific instrument; it is a mental response which allocates colours to categories. The eye does not see an infinite number of colours in the spectrum, the colours are categorized into red, yellow, blue, green and colours that bear resemblance to them. Similarly colours grading from a pure hue, say red, to white are simplified from an infinite number of steps to a group of colours which are red then a sudden jump to a group that are pink and a final jump to white. Similarly orange may be scaled down towards black with a sudden jump to the browns then to black.

The eye constantly struggles to bring order to colour classification from a world which is chaotic. The reaction to colour to a great extent, therefore, is personal and also to some extent culturally determined. We group colours in ways which have been given to us during the process of socialization. This is not simply the way in which colours are categorized but also the whole process of giving meaning to colour. The constant theme in this personalized classification of colour is the need to simplify the world of colour. If indeed complexity and fine colour discrimination were the objective then the dictionaries would be filled with words describing colour. In fact in English there are only a few primitive and specialized words for colours: red, yellow, green, blue, black and white. Most other words for colours are borrowed: violet, orchid, lilac, rose are from flowers; emerald, ruby, turquoise from stones, while cherry, lemon, lime, chocolate, olive, peach are all from foods.

In this infinitely complex world of colour it is the task of the designer to take this need for simplicity and to further order and structure colour so that it is comprehensible to the average viewer. The great artist usually limits his or her palette to a few of those colours distinguishable by human sight. This limited palette is the foundation of composition; simplicity is a necessity for appreciation. In theory any of the tones, shades or tints of a hue can be used in a composition – they are all harmonic. The primary colour can also be used with black, white or grey. It is often thought desirable to

further restrict the palette within the triangle shown in Figure 7.5 to one of the following series: black, grey and white; pure colour, tint and white; pure colour, shade and black; tint, tone and shade; tint, tone and black; tint, tone and shade; tint, or shade, tone and white. The older parts of cities such as Venice or Pisa, popular with tourists, are composed of buildings constructed mainly from materials found in the region. The range of colours of these materials are usually from a band within the much wider spectrum of the rainbow. Furthermore the colours of materials used in such traditional cities are usually modified hues, tones, tints and shades. Pure colour, when used, emphasizes and highlights special features and is confined to small areas. Contrast is provided by nature with a bright blue sky or a dark green lawn (Plates 7.6 and 7.7).

THE USE OF COLOUR IN THE CITY

Until the nineteenth century, European cities developed slowly employing indigenous materials from their regions for the building envelope. Architectural styles changed but the building materials did not. The constant use of local materials produced street, squares and whole cities with great visual harmony despite the varied forms. In this way the colour of the city was established and is an aspect of its history which has not been completely submerged by nineteenth- and twentieth-century developments. In Oxford's High Street many styles are reflected but all have been unified by scale, material and especially colour. The colour of Oxford is derived from the ochres of the yellow sandstone. In the traditional city there was easy access to cheap earth pigments for painting stucco façades. Even in the nineteenth century it was only the wealthy who could afford the brighter 'imported' or 'foreign' colours for doors and windows. Cities and regions have come to be associated with particular colour ranges: 'For instance, the ochres and reds of Lyons; and, among the blues and reds, the predominance of a "Maria Theresa" yellow in central Vienna. . . . There are also the brickdust reds and Georgian greens of a revamped Savannah, the pinks of Suffolk and Devon cottages, and the brilliant reds, blues and yellows of houses on the Adriatic island of Burano' (Porter, 1982). The problem posed for the urban designer is how to recapture such colour schemes and give individuality and distinction back to each centre.

Turin in 1800 set up a Council of Builders to devise and implement a colour plan for the city. The idea was to colour principal streets and squares characterized by a unified architecture in a co-ordinated scheme. The Council devised a series of chromatic pathways for the major processional routes to Turin's centre, Piazza Castello. The colour scheme for each route was based upon popular city colours and was implemented through permissions given for redecoration applications. It is not known how long the original colour scheme lasted but it was praised by Nietzsche in the late nineteenth century and by Henry James in the early twentieth century.

In his work on colour in the environment Jean-Philippe Lenclos (1977) has developed the ideas found in Turin's earlier experiment (Düttmann, et al., 1981). He has aimed to preserve a sense of place by devising a palette of colours relating to particular localities in France. Lenclos collects colour samples from sites within the region – fragments of paint, materials from walls, doors, shutters, together with natural elements such as moss, lichen, rock and earth. He analyses and structures the colours he finds to form a colour map for the region and a palette for intervention in the built environment (Porter, 1982) (Plates 7.8 and 7.9).

The lessons that can be learnt from Turin and Lenclos are twofold. First an environmental survey is necessary to establish a colour map of the region or city and from that colour map palettes established as the basis for colour schemes. Second, any colour scheme for a city should be comprehensive and capable of implementation. From earlier sections of the chapter it would seem desirable that any colour