
Urban form and innovation: the case of Cologne

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Abstract. *The physical form of Cologne is examined, principally during the period 1840-1990. The present built-up area is still orientated in relation to the central crossing place in Roman times of the cardo and decumanus. In recent decades the effects on the city core of traffic planning projects have diminished. The macro-spatial structure of the city appears to be largely independent of the aims and actions of individual generations of decision makers.*

Key Words: physical form, innovation, planning, transport, Cologne

Within the framework of the international research project Urban Innovation (URBINNO), several European cities were studied and compared. This paper outlines the main constituents of the physical development of Cologne.¹ It is based upon map analyses, field surveys, interviews with persons who played a key role in the recent development of the city, analyses of innovations, and the study of documents and published works. Four principal questions were addressed. How has the city reacted to new challenges in the course of the various time periods between the mid-nineteenth century and the late-twentieth century? To what extent has it been possible to use existing physical forms to accomplish new tasks? What principles does change follow, both within the existing urban area and in extensions to it? How far have transport innovations, such as the railway, tramcar and motor car, and planning innovations, influenced the form of the city?

Outward growth

The spatial structure of Cologne is still heavily influenced by the *cardo* and *decumanus* of Roman times (Figure 1). The significance of this ancient crossing of the main east-west and north-south axial roads is particularly evident in the western part of the city. It constitutes the focus not only of the semi-circular medieval city but of the city at all subsequent periods. Development follows a space-time logic. At first the areas immediately adjacent to the core were developed. Generally, these were the sites along radial roads. In a second phase the areas between radial roads were developed. When sites adjacent to radial roads became almost fully developed, development between radial routes took place; at first mainly along single streets, but later along ring-roads, which allowed the development of a wider area, connecting new development to the radial routes.

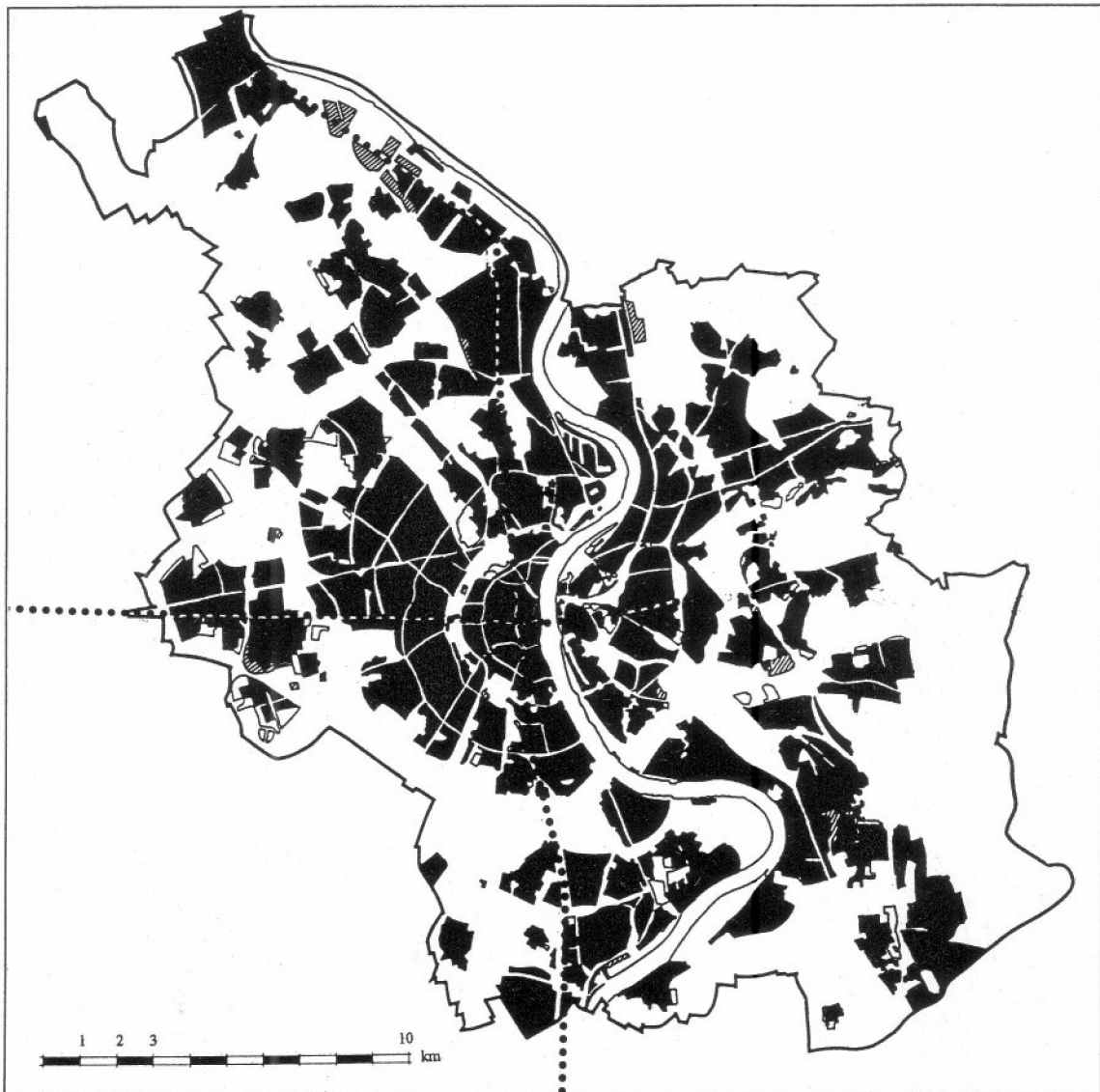


Figure 1. Built-up area of Cologne in 1995 in relation to the alignments of the Roman *cardo* and *decumanus* (shown by broken lines).

Depending on the level of land prices, when density reached a certain level in the core, the locus of strongest growth shifted outward. There was a dialectical relationship between core and periphery. To secure a minimum environmental quality in the core, certain spaces in that area were protected. At the same time, a proportion of commerce, industry and residential development was forced to the periphery. However, since the

city also depended on these uses, the increased demand for transport had to be satisfied by an extension of the transport network. Figure 2 shows the vigorous growth between 1938 and 1986 in the outer areas and suburbs of Cologne.

It appears that there is a spatial-temporal logic to the development of built-up areas that asserts itself without planning. One might ask whether town planning is

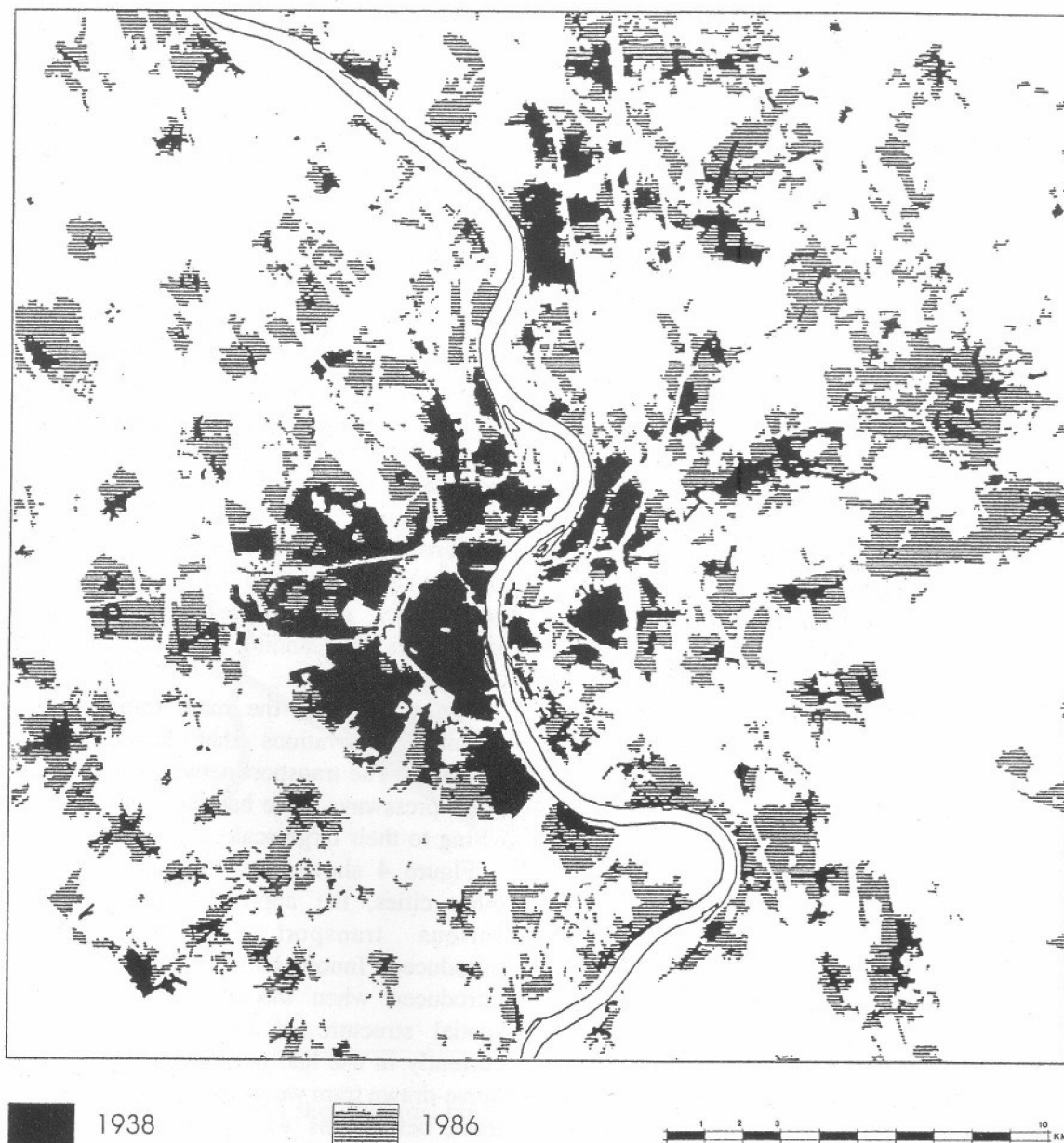


Figure 2. Growth of the built-up area of Cologne, 1938-86.

necessary at all; whether the inherent logic of the settlement process might be left to its own devices, and whether planning can be successful when it acts against this logic? Is the role of planning limited to the control of details, or can it, during certain periods, make a major contribution to city form?

Innovations

A major aspect of the role of innovations in the growth and change of urban areas is that they allow bottlenecks in the development process to be overcome. Indeed the occurrence of innovations may be seen as an

indicator of serious development problems. From our examination of urban, 'green', and transport innovations, it is apparent that such innovations as the garden city, the vertical city, and innovations concerning 'green systems' and types of building arrangements are related to more general urban theories. They leave freedom for individual decision taking and may be termed 'soft innovations'. In contrast, innovations relating to transport and other aspects of control over the circulatory system of the city may be termed 'hard innovations'.

At the scale of the metropolis, only large and dominant geometrical forms are likely to have a major morphological influence. In Cologne there are only two planning innovations on this scale: Stübgen and Henrici's ring-street New Town of 1880-1905, and Schumacher's expansion in a system of building rings and green rings.

The city core illustrates the influence of developments in transport. The loop of the railway cut through the city, creating a divide that remains today. The location of the main railway station on the northern edge of the old town resulted in the development of the city in a semi-circle to the north. There were two serious attempts to move the main railway station to the west - at the end of the nineteenth century and in 1950 - neither of which was implemented. When a railway station becomes well established at the intersection of various routeways, it becomes virtually impossible to relocate it. Today, Cologne still suffers from the location of its main railway station.

In contrast, the tramcar was easily absorbed into the road network, and the adding of a local railway and an underground railway did not have a particularly negative effect on the urban structure. The beneficial effect of the introduction of the tramcar lay in its reinforcement of the radial routes as an element of spatial organization. The reorganization of the city to accommodate the motor car caused the greatest damage, at least as serious as that resulting from the war.

Two ideas came together in 1950: the proposal to divide the city into

neighbourhoods and to open up the densely built up old town for the motor car by driving through new roads. The latter were succeeded by motorway-like high performance roads that divided up the old town and destroyed much of its structure. The dense pattern of plots was further reduced by the erection of two new bridges over the Rhine which had entry and exit ramps similar to those for motorways. Some roads, cut through 35 years ago, are now being re-incorporated as city streets with buildings bordering them. Such short innovation life-spans are commonplace. And in this light, it is necessary to question the process whereby new ideas in planning are adopted. Is it impossible to prevent the local administration from following short-term fashions? Were such interventions, leading in some cases almost to the extinction of the *genius loci*, unavoidable? Or are there approaches to planning that can be more circumspect?

Figure 3 shows the main transport and planning innovations that have affected Cologne. The transport networks, especially the expressways, have had the greatest effect owing to their large scale.

Figure 4 shows, for Cologne and eight other cities, the approximate dates when various transport innovations were introduced. Innovations appear to have been introduced when the development of the spatial structure of the transport system currently in use had reached its limits. The horse-drawn tram was replaced by the electric tram, before this was augmented by local railways and the underground. In the chain of innovations the motor car was not a replacement for these rail systems but supplemented them, particularly on routes that were uneconomic for bus and rail.

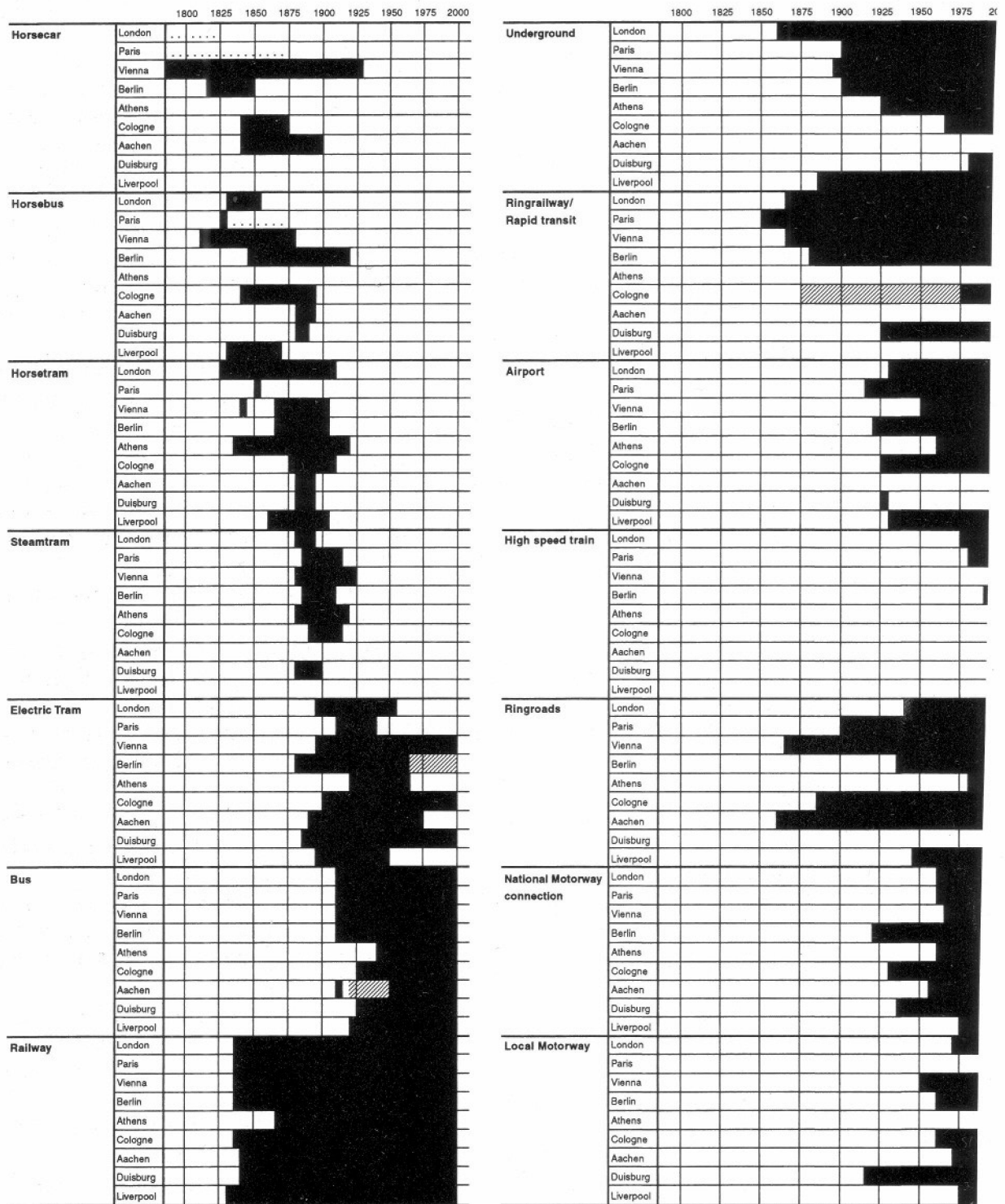
Table 1 shows for Cologne the dates of introduction of a variety of innovations. An approximate chronological sequence lasting several decades can be recognized during which an innovation was taken up by the urban structure like a wave which reached its limit before another wave of innovation followed.



Figure 3. Urban innovations, ring-road of 1880, and green rings of 1930.

As long as each new innovation is of comparable scale to, and can be integrated with, existing traffic routes, then there is no great problem. However, when a fundamental transformation becomes necessary, the immediate and probable subsequent costs, bearing in mind the durability of the innovation, must be assessed. A system with a life of about 30 years does not justify a fundamental alteration of valuable structures. The price in structural and cultural loss in historical towns

is simply too great. In the case of extensions to built-up areas, and in relatively new towns, the relative merits of conservation and redevelopment may well be different. In European cities with a historical character, a conservative approach of circumspect structural development in accord with existing scale and form, or the utilization of levels below ground (for example for underground railway systems), has proved historically more successful than major transformations.



..... No data obtained
 ■ Lifetime of system
 ▨ System works on a limited basis

Figure 4. Approximate dates of introduction and withdrawal of transport innovations in eight cities.

Table 1. The dates of selected innovations in Cologne**Urban structure**

| | |
|-----------|--|
| 50 | Roman grid |
| 1180 | Medieval wall and flexible integration of radial connections |
| 1880-1905 | New town development (Kölner Ringstrasse - Stübben, Henrici) |
| 1923 | Idea of ring-radial town development with divided cores (Schumacher) |
| 1950 | Twin-town (Schwarz) |
| 1950 | City of neighbourhoods (Schwarz) |
| 1950-95 | Rebuilding and transformation of city core |

Urban green

| | |
|---------|--|
| 1803 | Fortification and open defence area |
| 1923 | Idea of two green rings and green fingers (Schumacher) |
| 1927-97 | Development of the green system |
| 1950 | City of neighbourhoods and green fingers |
| 1978 | Open green space along the river |

Traffic and transport

| | |
|---------|--|
| 1923 | Idea of five ring-roads and 20 radials (Schumacher) |
| 1930 | Hohe Straße: first pedestrian street in Germany |
| 1950 | Idea of street widenings and new bridges (Schwarz) |
| 1962-87 | Planning and building of underground tramway |
| 1960-80 | Building of local motorways |
| 1964 | Idea of a motorway through the first green ring (stopped by public opposition) |
| 1977 | Idea of park and ride |
| 1995 | Idea of bike and ride |

Conclusions from the study of Cologne**a) General**

- The urban process tends to bring into use all sites within an acceptable time distance.
- It is impossible to preserve inner areas from building without legal measures.
- Networks of streets have a high stability over centuries.

- Mixed-use blocks are the best basic elements of the differentiated core-areas of towns.
- Mixed-use blocks with small plots react better to changing surroundings than blocks with large plots or only one plot (but the reality - as in Berlin - has been for redevelopment to create single-plot blocks).
- There is a permanent dynamic in the urban fabric seeking to find a balance between land uses and building structures.
- It is easy to disturb this balance but difficult to develop it.
- Layouts with clear building boundaries seem to be more stable than other layouts.

b) Morphological

- The Roman cross of *cardo* and *decumanus* works as the local and regional anchor for the built-up area.
- Most of the medieval road pattern still exists today.
- The western medieval ring of the town wall strongly influences the basic form of the western extensions.
- The existing ring-radial system, with 4-5 rings and up to 16 radials, is an excellent framework.
- The best large-scale division of urban space is the green rings of Schumacher and the green fingers.
- Important for the basic physical form of Cologne was the system of radials and rings, and the spatial organization of land uses.
- The discipline that is required by the logic of the public open spaces along the streets is much greater than architects imagine or wish.
- The physical form of the western part of Cologne is unique in Europe.
- The present stage is like a collage of innovations and compromises.

c) The role of innovations

- Cologne was - with the exception of railways, ring-roads and motorway connections - a late innovator.

- Some innovations have life cycles of less than 25 years. The shortest cycle was that of the urbanistic visions for new building arrangements - sometimes they changed after 10 years.
- The most serious morphological consequences have been caused by railway lines and motorways.
- Early industrial areas, railway areas and harbour sites are changing their function after 100-150 years of use. A process of reincorporation into the urban structure is occurring.
- While the process of growth in Cologne was often achieved with high urban quality, the process of reconstruction after the Second World War and the modernization of the inner city is associated with low urban quality and the destruction of the urban scale.
- Some of the roads widened in the post-war period will be reduced in width over the next few years.
- A clear process of spatial disaggregation can be recognized: functional planning for roads and technical infrastructure dominates. Urban space as an integrator and source of discipline has to be rediscovered.
- The traces of small-scale urban innovations in the urban physiognomy are minor.

General conclusions

The individual histories of cities contained in their physical structures are long-term assets.

To plan in conflict with these histories is to destroy something absolutely essential: the individual identity of the town. It is also a fundamental mistake to invest limited resources in a transformation for which long-term success cannot be guaranteed and in so doing waste resources that might have been used to solve problems in a structurally suitable and sustainable manner. At a time when 'sustainable development' has been given a new meaning, planning philosophies that have a conservative view of existing structures have a new justification.

In general the spatial structure of cities displays a character that appears to be largely independent of the aims and actions of single generations. It consists of the possibilities and limits which the network of transport routes, and its resultant built-up area, allow. Every generation has its own political and design options but these find their place and their limits within this framework. Despite some individual, specific events, which have a rather episodic character, the physical structure of the city is a reserve of spatially significant changes and a place of learning for urban planning and policy that has long been undervalued.

Note

1. Curdes, G. and Ulrich, M. (1997) *Die Entwicklung des Kölner Städttraumes. Der Einfluß von Leitbildern und Innovationen auf die Form der Stadt* (Dortmunder Verlag für Bau- und Planungsliteratur, Dortmund).

The City after Patrick Geddes

An International Symposium entitled 'The City after Patrick Geddes' will take place from 8 to 10 May 1998 in Edinburgh. It will explore Patrick Geddes's influence on planners and architects, especially recent generations. It will also consider ideas in twentieth-century planning and urban design philosophy, and will reflect on

the future of the city at the end of the century. Further information is available from the Patrick Geddes Centre for Planning Studies, University of Edinburgh, 20 Chambers Street, Edinburgh EH1 1JZ, Scotland, UK. Telephone +44 131 650 8971; Fax +44 131 226 6570.