Introduction
INTRODUCTION

Settlements occupy an important position among all the visual imprints made by man upon the physical landscape through the process of cultural occupancy since the dawn of human civilization. The evolution and growth of a settlement in an area is the result of the interplay of the prevailing ecological conditions, cultural and social values of the residents, technology, management system and the settling process through time span. In the initial stages, settlements bear simple forms and have close relationship with the environment. However increase of knowledge and growth of civilization increases variability in the forms and sizes of settlements.

Spatial patterns, types, shapes and sizes, the structural morphology of the dwellings (building materials, architectural design, ground plans, orientation etc.) and socio-spatial patterning of the houses of settlements provide clear evidence of the influence of the physico-cultural and socio-economic features of a region.

Rural settlement geography is a relatively recent branch of human geography in the English-speaking world. In Germany and France, however, its tradition is fairly old. The word 'rural' has been derived from the Latin word ruralis, which in its turn has been formed from rue or rusis meaning
'the country'¹ The word 'settlement' has its origin in the Old English word 'setl' meaning 'seat' or 'place of rest' (to place) denoting a 'settled colony'. But in modern geographical literature it refers to an organised colony of human beings ranging from a simple farmstead to a highly complex city and from a temporary camp of hunters or miners to houses of more sedentary people like farmers and city dwellers. Settlements include not only different kinds of buildings put to a number of uses but also lanes, streets, roads, parks, places of worship and playground etc. A rural settlement is a complex entity, which has been defined as the distribution of buildings by which people attach themselves to the land for the purpose of primary production.² But this definition amounts to the exclusion from examination some important parts of rural settlement geography such as building materials, architectural styles, land use and fence types etc. This approach of Stone was broadened by Jordan who defined the subject as the study of the form of cultural landscape, involving its orderly description and attempted


'Form of the cultural landscape' is a term which needs clarification. It is synonymous with settlement morphology and includes (a) vertical arrangements and dimensions (such as number of storeys in houses), (b) horizontal arrangements and dimensions (such as the distribution of buildings, floor plans of houses, or pattern of fences and fields), and (c) material composition (such as brick vs. wood in house construction or live hedges vs. wire fences).

The most significant theoretical framework of settlement formation has so far been developed by C.A. Doxiadis. He sets forth five principles, illustrated with hypothetical diagrams (Fig.1). The first principle is the maximization of man's potential contacts with natural elements, (e.g., water, trees, etc.), with other people and other cultural elements (e.g., buildings, roads, etc.). The second principle is the minimization of effort required for the achievement of man's actual and potential contacts, according to the general principle of least effort. The third principle is the optimization of man's protective space at every movement individually or in a group, in any situation or locality, whether it is temporary or permanent, whether he is alone or part of a group. The fourth principle is the optimization of the quality of man's relationship with

FIVE PRINCIPLES OF SETTLEMENT-FORMATION

1ST MAXIMIZATION OF POTENTIAL CONTACTS
GIVEN CERTAIN CONDITIONS IN A CERTAIN AREA

2ND optimization of man's protective space if he is alone

3RD optimization of man's contacts with others

4TH OPTIMIZATION OF THE QUALITY OF MAN'S RELATIONSHIP WITH HIS ENVIRONMENT

THE FIVE ELEMENTS OF HUMAN SETTLEMENTS ARE NOW OUT OF BALANCE

5TH OPTIMIZATION IN THE SYNTHESIS OF ALL PRINCIPLES

FIG. 1
his environment, consisting of nature, society, shells (buildings and houses of all sorts), and networks (lanes, street, roads, communications, etc.). The fifth principle is that man organizes his settlements in an attempt to achieve an optimum synthesis of the previous four principles. This optimization works naturally through time and space, as well as the prevailing conditions and man's ability to create a synthesis.

There are several works on rural settlements, giving their evolution, pattern, types, distribution, etc., described under two sets of grouped factors i.e., the physical and the cultural. Rarely has there been an attempt made to dwell on the total situation, i.e. the settling process. None of the above factors in the study of rural settlements can be dealt with without taking the process of settling and space articulation into consideration.

Apart from space articulation or territoriality, there are also other pertinent factors, which are capable of general application. Doxiadis has developed a four fold frame which can be applied to composite individual settlements of all sizes in a territory as well as to its constituent parts (Fig. ii). Hypothetically, any settlement consists of four parts: (i) homogeneous part, (ii) central part, (iii) circulatory part, .and (iv) special part. These parts are
Parts of Human Settlements

Any settlement consists of:
- Homogeneous Part
- Central Part
- Circulatory Part
- Special Part

A village consists of:
- Homogeneous Part (Fields)
- Central Part (Built Up)
- Circulatory Part (Roads and Paths)
- Special Part (Temple)

The built-up area of the village consists again of:
- Homogeneous Part (Houses)
- Circulatory Part (Street)
- Central Part (Shops)
- Special Parts (School or Temple)

Fig. 11
always subject to change but they are always present in a living settlement.\(^1\)

The scientific study of settlement geography began in Germany with Ritter's work whose theme of man-land interdependence provided a base for the study of the subject in the early nineteenth century. Later, Kohl, Richthafen, Ratzel, Meitzen, Grandman, Martiny, Christallar and Nitz in Germany, Blache, Brunches, Demangeon and Blanchard in France, Lefeure in Belgium, Bowman, Hall Kohn, Stone, Jordan and Hudson in the United States, Bunge, Bulund, Hagerstrand in Sweden, Aurousseau in Austria, Ahlmann in Scandinavia, Howton, Chisholm and Haggett in Britain, Ahmad, E.; Singh and Mukerjee, in India and Doxiadis in Greece made significant contributions in the field of settlement studies.

Rural settlement geography in India has not received adequate attention, compared with as other branches of geography. During 1960-70, R.L. Singh initiated a number of studies of rural settlements in the Ganga Valley. The first description of the Indian village can be seen in Kautilya's Arthasastra.\(^2\) In modern times, the first systematic approach

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to the subject can be found in the works of Baden Powell\textsuperscript{1} and
Mukerjee.\textsuperscript{2} Mukherjee has thrown light on the dwellings of
Indian communities, while Baden-Powell has mainly described
their social and land-revenue characteristics with particular
reference to land-owning castes and clans. Singh has analysed
the evolution of rural settlements in the Middle Ganga Valley
over a long span of time, based on the territorial patterning
of different clans in relation to the various physical and
cultural factors. Ahmad has described types and patterns of
rural settlements in Uttar Pradesh in relation to physical
and cultural factors. Interesting results could be observed
in the work of Nitz., who has compared the field pattern of
northern India with that of Germany on the basis of
historical growth and castes structure.

It is worth mentioning that the analysis of
multifaceted evolution of rural settlements and their
spatial variations in an ancient settled region like the
Aligarh District is a difficult task. This is due to a
complexity of successions, absorptions and interruptions by
later settlers on the one hand, and lack of adequate data and
records on the other. However, an attempt has been made in
the present work to trace the evolution of rural settlements

\textsuperscript{1} Baden-Powell, B.H. '\textit{Indian Village Community}, London, (1896).
and their spatial variations in the Aligarh District, with the help of the available sources and field survey.

The beginnings of the rural settlements in the study area go back to the prehistoric period. Excavations at various sites of the District have revealed that the settlements of this region had begun around 1500 B.C. The earliest remains, i.e., pieces of Ochre Colour Pottery (OCP) have been found at Jalali. Then, successive cultural remains of different periods have also been recovered from different places in the region. Aryans came to India, gave up their nomadic habits and set up permanent settlements along the tributaries of big rivers. The dwellings in their settlements were made of wood and bamboo and they do not differ much from those found in many other parts of India as well as in the study area even today. The Aryan migration started in the region in the ninth century B.C. and had been completed by the end of the seventh century B.C. The region was at first affected by the migration waves of Rajputs clans at the beginning of the twelfth century A.D., and migration of various corporate groups or clans on a much larger scale followed the Muslim invasion in 1194 A.D., when the fortress of Koil was captured by Qutubuddin Aibek. Since waves of migration continued up to eighteenth century, each of which has left its imprints upon the study area, a distinct socio-economic and cultural ethos has emerged in it. It is rather
difficult to trace the patterns of ancient and medieval settlements until extensive excavations have been conducted, which is impossible on account of the high density of population in the region. So the existing rural settlements have been taken into consideration for spatial analysis.

The majority of the people of the study area live in villages. This is a clear indication of agricultural development and stability on the fertile upper Ganga Yamuna doab. Initially people lived in scattered hamlets, and later they clustered together in favourable spots either along the water courses or highways, which and gave rise to the compact village type. Several historical and physico-cultural factors such as better means of transport and communication, efficient irrigation and improvement of socio-economic condition of the people together with the increase of population have been the main causes of the clustering of human habitations in many parts of the study area. In contrast to the compact type, there is the scattered type of rural settlement occurring in infertile tracts, usar infested areas, and areas with poor irrigation and transport facilities in the Aligarh District.

The rural settlements of the District do not appear to have been established on a planned basis, but to have just grown. Some of the settlements are still found surrounded by walls, especially in the north western part of the Aligarh
District, which indicates that they were established at a time when settlers needed protection from outside attack. Moreover, in most cases the shape of the village is roughly rectangular. Other geometrical shapes, such as square, semi circular and elongated are also found in some areas. A detailed description of the shapes of villages along with the layout of the village roads is to be found in a treatise on village plans, called "Mansara Shilpasatra", believed to have been compiled in the fifth century B.C. It is therefore, very likely that some of the settlement conformed to the traditional village plans, indicating thereby that there has been a continuity in the growth of settlements from the Aryan period to the present time through ancient, medieval and modern periods in India in general and in the study area in particular. This is also corroborated by the fact that the villages of Buddhist time, like of those today, were compact and self sufficient and extended in a linear form along the principal waterways. With the decline of Buddhism and the disappearance of rural republics by the end of the fifth century A.D., the compactness of the village was broken and settlements got scattered into hamlets. During the Medieval period, villages remained practically unchanged as the Muslim preferred to live in towns rather than in the countryside. With the establishment of the British rule, the village type remained almost the same although the need for living within the village wall was no longer felt by the people due to the
restoration of peace and security in the region. The surplus rural population came out of the village ramparts and established hamlets in the neighbourhood of their fields.

The selection of the Aligarh District for the present research is due to its uniqueness in many respects. The District lies in the fertile Ganga Yamuna doab. The Aligarh District has an agrarian base and presents diverse physico-cultural and socio-economic conditions at micro level in its different parts. It is one of the most ancient settled region and has a long history of peopling and occupancy. Several archaeological findings, historical records and local legends pertaining to the pre-historic time, show that the study area was initially occupied by the Kols. In spite of the intermixing of various ethnic groups and cultural traits from within and outside the country the study area has preserved its own traditions, culture, myths and related norms and values, which has resulted in shaping the uniqueness in its identity and is known as the Braj culture. It may be added that no serious study on the evolution and spatial variation of rural settlements has been made so far in the District.

Objectives of the Present Study

The theme of the present study is an analysis of the various aspects of the evolution of rural settlements and their spatial variation in the Aligarh District. Keeping this in view the main objectives of this study are as follows:
(1) To trace the evolution of rural settlements from prehistoric times to modern period with the help of cultural ecology and place names analysis, and also to examine the territorial evolution of different clans in the study area between 1600 and 1833 A.D.

(2) To identify the influence of various physico-cultural and socio-economic factors on the distribution, types, spacing and dispersion of rural settlements in the study area.

(3) To study the factors that are responsible for the formation of different patterns of rural settlements, to analyse the shapes of villages and to suggest suitable plans for rural development in the Aligarh District.

(4) To identify rural house types on the basis of their building materials and sizes and to suggest suitable house plans for the District.

(5) To analyse the social morphology of selected villages (built-up areas) based on the religio-ritual and secular dominance models, and also to examine the influence of castes and dominant landownership on the spatial patterning of rural houses in the study area.

Methodology

The present pattern of settlement distribution is the result of a long process of extension, growth and retreat of settlements. In order to understand the present formal
pattern of rural settlements it is, necessary to look into the past. Keeping this aim in view an attempt has been made to analyse the evolution of rural settlements and their spatial variations in the Aligarh District.

The following sources have been extremely helpful in providing significant clues to the understanding of the evolution of settlement patterns in the District:

(a) Archaeological findings
(b) Historical sources
(c) Written records
(d) Place names, culture, cults and folk lore
(e) Maps
(f) Field surveys and interviews

Archaeological findings comprise earliest remains, i.e., pieces of ochre coloured pottery (OCP), black and red ware (BRW), painted grey ware (PGW), classical northern black polished wares (NBPW) and medieval glazed ware (MGW). These finds reveal that the region has been extensively inhabited since prehistoric time. A large number of terracotta male and female figurines, plaques, sculptural pieces, corroded coins, burnt bricks, fragmentary inscriptions on stones, statuettes, ruined brick stupas etc. have been found in the study area. These evidences shed light on the sway of different dynasties from prehistoric period as well as ancient and medieval
period. The antiquities recovered from the study area are well preserved in the Mathura Museum.

Written records include 'Ain-i-Akbari by Abul Fazl, Misl-i Bandobast (1866), (Miscellaneous papers of revenue settlement), Institute Gazette, District Gazetters, Gazetteers of the United Provinces of Agra and Oudh, Memoir North West Provinces of India, Memoirs Statistical Descriptive and Historical Account, Alygarh and a large number of books on regional and local history. These are preserved in the State archives, revenue records rooms of the District and tehsil headquarters and libraries.

Culture, cults, folklore, legends, and oral history as narrated by the people, interviews and field surveys have been used to trace the place names of the villages.

To examine the spatial distribution and types of settlements in terms of spacing, degree of dispersion and concentration, quantitative techniques have been used in the following manner.

\[ i) \quad D = 1.0746 \sqrt{\frac{A}{N}} \]

\[ ii) \quad R_N = \frac{r_o}{r_E} \]

For the identification of settlement types, village and hamlet ratio as well as inter village spacing has been taken into consideration.
For the analysis of the pattern or shape of settlements both qualitative (classical), and quantitative (modern) approaches have been applied. Shapes of settlements have been measured taking 10% of villages as a sample on random basis, using the following formula.

i) \[ S = \frac{A}{\pi R^2} \]

The shape analysis of settlements has also been made by taking into account the number of contacts between a village and its neighbouring villages. Dirichlet/Thiesen Polygons and Hexagons have been used for proper planning of rural settlements. The composition of building materials has been taken into consideration for the classification of rural houses. Social morphology or spatial patterning of built-up areas of selected villages of different types belonging to different tehsils of discrete ecological settings at micro-level has been analysed on the basis of religio-ritual and secular dominance models.

The study is primarily based on field work and analysis of relevant topographical maps as well as orally recorded history. Field work has involved extensive traversing through the study area with the aim of observing the landscape features of the study area. Observation of the landscape includes a careful examination of the village landscape its settlement morphology, house types, building
materials used, ground plans, modes of house construction and religious symbolism attached it to (if any) and general living condition of the people. Such detailed field work on the core elements of rural settlements has, however been limited to three selected villages.

The Survey of India topographical sheets of the District on the scales 1:250,000 and 1:50,000 have formed the basis for studying the distribution, types and patterns of rural settlements in the Aligarh District. Similarly for a morphological study of the of sample villages cadastral maps (scale 16"=1 mile or 1.3960) have been used, while the nearest neighbour analysis is based on the tehsil maps contained in the District Census Handbook, 1981, duly corrected, all the maps being joined together to form the District map. Various atlases such the National Atlas, Uttar Pradesh in Maps, Census Atlas of U.P. and Atlas of the Mughal Empire, have also been used for drawing the outlines of the District and for identifying the territories of the study area during the medieval period.

The collected data, both primary and secondary has been presented in tabular form and analysed, using different quantitative techniques to derive specific conclusions regarding dispersion, spacing, shape analysis and settlement types. Sample choropleth mapping has been adopted throughout the work. A plethora of tables has been avoided by
cartographic representation, Community Development Blocks have been chosen as areal units for the analysis, and Panchayat level analysis has been taken in the study of settlement types. Nearest neighbour distances for all the villages of the study area have also been measured.

Plan of the Study

The entire study has been divided into seven chapters excluding conclusion and suggestions. Chapter I deals with the general physical and cultural setting of the study area with emphasis on physiography, drainage, climate, soil, as these are the basic physical factors in determining the settlement formation and growth, and also provides an account of various cultural attributes, e.g., land use, cropping pattern, crop-association, irrigation, transportation and communication, manufacturing activities and rural market centres, socio-economic factors which directly affect the spatial patterning of rural settlements.

Chapter II deals with the demographic structure and distribution of castes in the District, Since the patterns of rural settlement distribution and social morphology of the dwellings in an area are greatly affected by its demographic characteristics and composition of castes in it.

Chapter III throws light on the evolution of rural settlements in sequent occupancy, taking into account the place-names analysis, culture and cults, archaeological
evidences and written records. It also deals with the evolution of territorial units through land occupancy of various zamindars clans or corporate political group between the sixteenth and the nineteenth century, who functioned as the dominant local power in different parts of the region and always occupied the best available sites of the territory and allowed other, non-corporate group of men and women to settle on lands given to them to carry out their socio-economic activities within its organisational framework.

Chapter IV is concerned with the analytical study of different physico-cultural and socio-economic factors which have affected the distribution, siting and types of rural settlements. It describes the sizes of the rural settlements in terms of area and population and discusses the nature of spacing and dispersion with the help of quantitative techniques.

Chapter V examines the various patterns of rural settlement found in different parts of the study area in response to the physical and cultural factors. These patterns have been identified on the basis of the Survey of India topographical sheets and have been checked and modified with the help of village cadastral maps and through personal observation, wherever possible. Shape analysis of the villages has been based on quantitative techniques, taking into account 10% of sample villages on random basis.
Further, relationship between among contact index, population density and areal size of the villages has been studied. The present researcher has recommended that Thiessen polygons and hexagons be adopted as model while planning the developments of the villages in the study area.

Chapter VI deals with the evolution, distribution and density of rural houses in the study area. It also assesses the impact of various physico-cultural and socio-economic factors on building materials, shapes, sizes and morphology of rural dwellings. Suitable rural house plan and a few remedial measures have been suggested for improving the village environment.

Chapter VII seeks to analyse the social morphology of three selected villages (built-up areas), based on the religio-ritual and secular dominance models. The influence of castes and dominant land-ownership on spatial patterning of rural houses of these three selected villages of the District have been examined through field observation.

In the end conclusions have been drawn. Some suggestions have also been made for future studies in the present area of investigation.