4.2. THE ADVANCED MEDIAEVAL PERIOD, 1000-1300 A.D.

4.2.1. Contributions of Arab Geographers :

In Mediaeval age, Arabic civilisation was the most advanced of all civilisations. Prophet Mohammad spread Islamism in the 7th century A.D. Within a short period it reached the pinnacle of civilisation. Almost all Arabians accepted Islamism before Mohammad's death in 632 A.D (Rana, 2008). People of many different countries, such as—Iran, Syria, Egypt, Middle-East, North Africa, Spain etc. accepted Islamism within a century of Mohammad's death. Before the spread of Islamism, the Arabs were illiterate. After it they progressed rapidly and even outdid the Europeans. Bagdad became the most civilised city (Ali, 1959, 1965 and Alavi, 1965).

In 641 A.D. and in 642 A.D. followers of Islam conquered Persia and Egypt. By 732 A.D. they got control on entire Great Desert (Hussain, 1995). Then they took possession of France after taking control of Iberian Peninsula. Muslim rule were extended eastward up to India and some of the islands of South-East Asia. They also organized expedition across the Black Sea into the Russian Steppe. Similar expeditions in Europe, North Africa and Asia helped them to simulate knowledge about the land and people they conquered. Spread of Islamic culture also helped them to prosper and progress culturally.

The famous educational institution '***Baitul-Hikma***' was founded in Bagdad with the active support of the caliph and religious teacher ***Harun-al-Rashid.*** Scholars from all different parts of the globe came here and translated the books written in Greek, Persian, Latin, Sanskrit, etc. into Arabic. Indian scholars were invited there to teach statistics and mathematics.

Thus the Arabs assimilated concepts from the Greeks, Romans, Indians, Iranians, etc. only to form and discover new concepts. They learnt the art of medicine from the Greeks. It is continuing as *'yu-nani'* system of medicine for generations. The term *'yu-nani'* means "Greek". The Arabians invented their own set of letters known as *Calligraphy*. Jerusalem of Israel, Cairo of Egypt, Istanbul of Turkey and many other cultural hubs were there in addition to Bagdad. Many Arabic scholars of this age enriched geography (James and Martin, 1981). They are the following :

Al-Battani (858-929):

Al-Battani was a noted astronomer, astrologer and mathematician.

➡ Astronomy : He won fame for his discoveries in astronomy. His most important discovery is that he almost accurately calculated the length of a solar year which is 365

days 5 hours 46 minutes and 24 seconds (Rana, 2008). He tried to explain obliquity of ecliptic orbit, length of seasons, average and actual solar orbit precisely. He explained the possibility of annular eclipses. He deduced the orbits of moon and planets and propounded a theory to determine the condition of visibility of the new moon. His famous book on astronomy is "*Kitab az Zig*".


Fig. 4.2 Al-Battani

➡ Mathematics : He solved many problems of orthographic projections. He applied his mind to many complex trigonometrical and mathematical problems. He wrote some books on astronomy and trigonometry. In the year 1100, his book ***"De Scientia Stellerum – De numeris stellerum et motibus"*** was translated into Latin (Rana, 2008). His essays on astronomy were very popular in Europe up to Renaissance period.

Al-Masudi (896-956) :

Al-Masudi is known as a famous discoverer of Arab. He travelled the vast areas of India, Middle-East and Africa.

➡ Style of Writing : He was called the '*Herodotus of Arab*' (wikipedia 2018). He combined history and geography. His writings can be distinguished from those of his contemporaries. He gave proper explanations of historical facts and their social effects. His book 'Meadows of gold and mines of gems" *(Muruj adh-dhahab wa ma'adin aljawhar)* is about the world history. *Kitab al-Tanbih wa al-Ishraf* (The book of Admonition and Revision) is another book written shorty before his death is a classic potrait of his time.


Fig. 4.3 Al-Masudi

➡ Observations of Weather : His description on the climates influenced by the monsoon winds is very informative. He observed the natures of the monsoon during his travel along the east coast of Africa. He gave generalized concept of monsoon by analysing the observations he made. He tried to explain the formation of clouds by evaporation of water.

➡ Conception of Earth : He came to the realization that the surface of earth is round, not flat.

➡ Humanistic Geography : He tried to explain the environmental influence on society. In this respect he had deterministic outlook. Al-Masudi's interpretation of the reasons of the rise and fall of nations is interesting enough.

Ibn Sina (980-1037):

Though a doctor, he made huge contributions to mathematics, philosophy, chemistry etc. The *Canon of Medicine (al-Qanun fi al-Tibb)* is famous as encyclopaedia of medicine. His book ***Kitab-al-Shifa*** (The Book of Healing) is considered the encyclopaedia of philosophy. Here he had combined the philosophies of Aristotle and Plato and created a new philosophy by combining the religious teachings of Islam with them. He had divided knowledge into two branches – practical and theoretical.

Muhammod al-Idrisi(1099-1165):

His contribution to the study of geography of his age is unquestionable.

➠ Travel and Observation : He emphasized the importance of the collection of information on the basis of travel and direct observation. He travelled Lisbon, Spain (Andalusia), France, England, Sicily, Marocco, Constantine, Asia Minor and the internal parts of Africa. He nicely presented his information in a book entitled ***"Amusements from him Who Desires to Travel around the World"*** in 1154 and corrected the wrong notion of enclosed Indian Ocean. He contributed largely in describing economy, topography and cultural attributes of various regions of Asia and Africa in his books ***'Al-Kitab-al-Rujari'*** (Roger's Book) and ***'Nuzhat-al-Mushtaq-fi-khtirag al-Afag'***. His book "*Kitab al Mamalik wa al-Masalik*" formerly known as *Rawd-Unnas wa-Nuzhat al-Nafs*" ("Pleasure of men and delight of souls") was considered as geographical encyclopaedia (Rana, 2008).

Fig. 4.4 Al-Idrisi

➠ Concepts Concerning the Distribution of Continents, Oceans and Rivers : He got rid of the misconception that the Indian Ocean is surrounded by the land and brought to the knowledge of its true shape and stretch. Previously the Caspian Sea was considered world ocean. These misconceptions were also removed by him. The source and the course of the rivers Nizer and Daniub were known from his writings.

➠ Medical Science : In his book *'Kitab-al-Jami-li-Sifat-Ashtat-al-Nabatat'*, he described a number of medicinal plants. He also reviewed existing literature on the same subject available so far (Rana, 2008).

➠ Drawing of world map : His world map contains a lot of information about the world. He presented detailed information about different parts of Asia. In his map the south is placed on top. The drawings of China and Africa are faulty, yet it is better than the map drawn by Ptolemy. Christopher Columbus is said to have made use of the map drawn by Al-Idrisi.

➠ Climate Area : His division of different climate areas matches greatly with the modern division. The divisions of Al-Idrisi are more practical than those of the Greek scholars.

Fig. 4.5 Ibn Battuta

Ibn Battuta (1304-1369):

Ibn Battuta was the most dominant geographer and profound traveller of 14th century. The title of his book is *'Kitab-ul-Rihlah"*. He travelled most of the Islamic world during 1304–1369 CE, and near the end of his life he dictated an account of his journey which provides a picture of medieval civilization. The term *"Rihlah"* means travel.

➠ Travel and Observation : In 1325, at the age of 21 years he set out on a pilgrimage to Mecca for a holy religious purpose. After this he travelled Egypt, Syria, Iraq, Persia, Arabia, Zanzibar, Asia Minor, the Caspian Sea, Constantinople,

Khwarizm, Bukhara, India, Maldives, Ceylon, Sumatra and China. He travelled along the African east coast and moved upto Kilwa, situated at 10° south of the equator. During his travel at Kilwa, he came to know about Sofala of Mozambique. It is situated 20° south of the equator and is an Arabic centre for trade and commerce. From Mozambic he again returned to Mecca and travelled Bagdad, Persia and the adjoining areas of the Black Sea. He also moved up to Samarkhand and Bukhara through the Steppe regions of Russia. In his life, he covered 75,000 miles in 28 years (Rana, 2008).

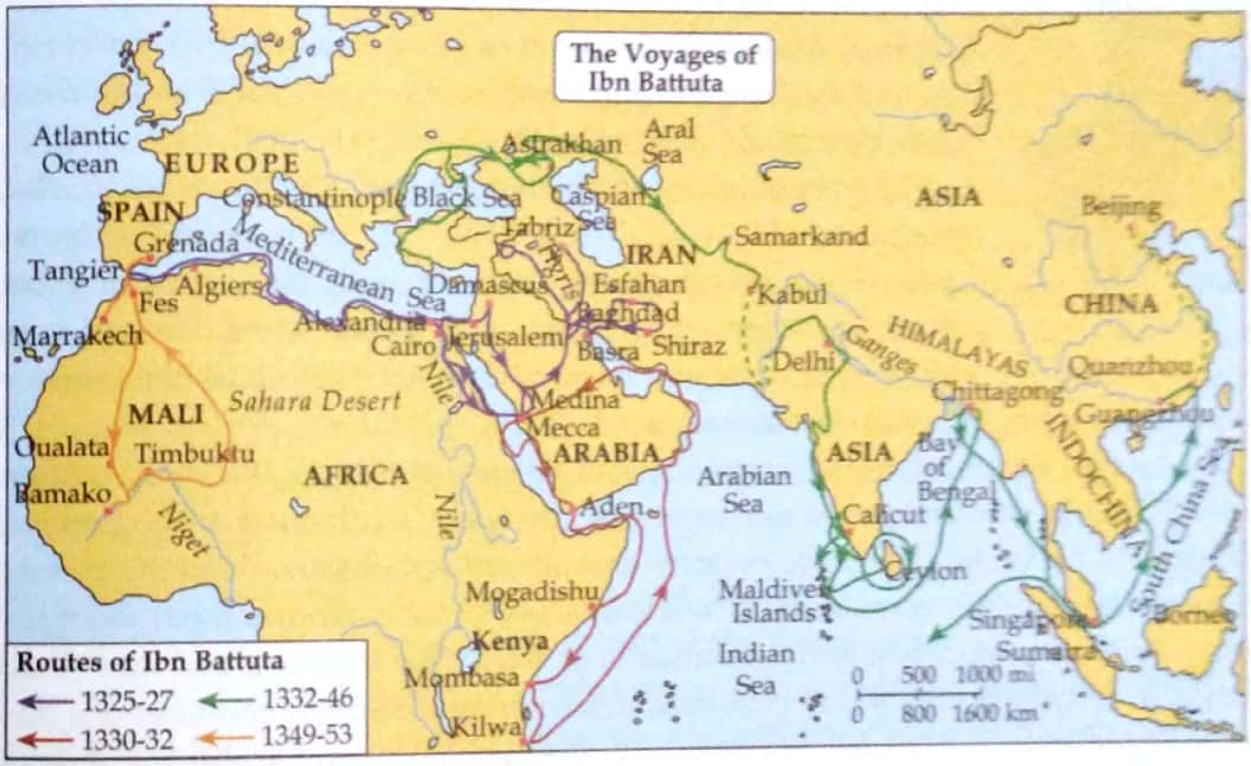

Fig. 4.6 Travel Routes of Ibn Battuta (https://www.britannica.com)

➡ Conception about Climate : According to Aristotle, the southern part of the equator is unfit for human habitation. But Ibn Battuta realized from his practical experiences that the torrid area is not unfit for human habitation and many communities inhabit there.

➡ India, Middle-East and Africa : He came to India from Samarkhand via Afganistan. He became a courtier in the court of Mohammad Bin Tughlaq. He travelled India during this time. The sultan of Delhi sent him to China as an ambassador. During this time he travelled Maldives, Sri Lanka, Bangladesh, Assam, Dacca and Sumatra. Finishing his travel to China he set off for Morocco and Egypt and journeyed to Sardinia, Spain, Sahara up to the river Nizer after travelling Egypt, Alexandria and Tunice. There he collected important information about the tribe of Nigro who accepted Islamism.

Al-Biruni (973–1048)

Al-Biruni passed his childhood in a town called Khwarezm in the state of Uzbekistan. Here he received the patronisation of the king and became a scholar in philosophy, religion, mathematics, medicine and literature. Al-Biruni's real name was Abu-Rayhan Muhammad ibn Ahmad Al-Biruni. Immigrants were called *'Biruni'* in the state of Khwarizm, so he was called Biruni.

His thinking was much ahead of his time. He had excellent power of scientific analysis and had very versatile tallent. He was in favour of biasless, non prejudiced and scientific analysis of collected information. In Islamism, travel is considered as the means of learning. Al-Biruni travelled many places with the objective of learning. He was competent in different languages, such as— Persian, Turkish, Syrian and Sanskrit.

Fig. 4.7 Al-Biruni

➠ Writings : Al-Biruni wrote many books on various subjects. His famous books are (Hussain, 1995) : (i) *Kitab-al-Hind*, (ii) *Al-Qanun-al Masudi* (The Canon of King Masud), (iii) *Vestige of the Past Athar-al-Bagiya*, (iv) *Tarikhul Hind*, (v) *Kitab-al Jamakir*, (vi) *Kitab-al-Saydna*, (vii) *Codex Masudicus*.

He translated *Patanjali* into Arabic. He wrote 27 books on geography. He wrote four books on each of the subjects of cartography, geodesy and climate, and the remaining books are on land survey, planets, stars, meteors, etc. He had natural skill and competence in varied subjects. He had competency in mathematics, geography, physics, astronomy, etc.

➠ Astronomy : He popularized astronomy and geography. Out of 146 books written by Al-Biruni, 95 books were related to astronomy, mathematics, mathematical geography and related subjects. He broke all popular customs and misconceptions to uphold the usefulness of these subjects. The daily usefulness of the knowledge of mathematics and astronomy came to the fore by their application in the calculation of tides. This mathematical knowledge is also useful in calculating planetary positions, determining directions and locations during travel and expeditions. On cosmic creations, he wrote a book entitled "*Al-Tahdid.*" A detailed study on the origin of universe is found in this book. In his book "*Tahqiq ma li-l-hind*" he wrote an extensive commentary on Indian astronomy. Biruni's astronomical work "*Masud Canon*" suggested the motion of Sun. His book "*Harkatah-al-Shams*" and "*Kitab-al-Tatbiq ft Tahqiq*" are on the relative movements of the sun.

➠ Earth : He was the first person to discuss the difference of the length of days and nights at different places on earth. His book "*Risalah*" is written on this topic. He clearly explained the solar and lunar eclipses in his book "*Qunun-al-Masudi*". He explained the colourful display of lights in the sky at sunset and sunrise. According to him, this occurs when the sun moves below 18° in the horizon. It is found true in present times. He said that the moon does not rotate in a circular orbit and the distance between the sun and the moon is variable. He is the originator of the concept of the lunar month. He established the relation between the moon and the tides.

➠ Physical Geography : He had profound interest in mathematics, geometry, physics, topography and archeology. He wrote 27 books on geography. He also wrote many books on cartography, geodesy climatology, comets, meteors, surveying, geology and many more. He noticed extensive erosional plain along the coast of the Caspian Sea. He opined that the Gangetic plains are formed by the deposition of silt by the rivers. He explained the causes of floods and springs. He described different seas and bays. He said that the Indian

Ocean has link with the Red Sea and the Persian Bay. He opined that the earth, inhabited by living beings, stretches from China, in the east, to Spain, in the west. The Himalayas stand in the middle of it like the backbone. He believed the Nile to be springing from a highland in the middle of Africa and the flood in the Nile is caused by heavy rains at its source. He opined that the main Asian rivers spring from its central mountains, i.e., the Himalayas. In his book '*Codex Masudicus*' (1037) he predicted the existence of North and South America.

➡ Regional Geography : During the reign of Sultan Mamood, Al-Biruni came to India from Gazani, in the Middle-East. He gave a full account of India. His account of the country from Kashmir to the end of the Deccan plateau is mostly correct. He suggested that the rainfall in the Deccan is mostly controlled by two mountains the Eastern Ghats and the Western Ghats. He gave a full and correct account of the source and the course of the Indus. He presented a beautiful account of inaccessible mountain rings surrounding the valley of Kashmir.

He gave an account of Indian climate. He said that here maximum rainfall occurs during summer. He also explained the rainfall during winter in Kashmir and Punjab.

➡ Human and Cultural Geography : He was more concerned with life styles, customs, beliefs, means of transportations, wealth, art, etc. of people than natural topography. His famous book "*Rilah*" gives a full account of Islamic economy, mainly agriculture, soil, politics, etc.

Ibn Khaldun (1332-1406):

Ibn Khaldun was the last important scholar of the Islamic age.

➡ Social and Political Geography : He is known as historian and as well as geographer. He is marked as the first exponent of socialism. He is the only Muslim philosopher, telling about mediaeval Muslim society and its political affairs.

Fig. 4.8 Ibn Khaldun

In his book "*The Muqaddimah*" or *Prolegomena* (Introduction) which means an entry to history, he successfully expressed Muslim views about history. He is the first man to give universally acceptable explanation of Islamic society and its political affairs. This book was divided into six volumes (Hussain, 1995):

(i) "*Civilization, Geography and Anthropology*", (ii) "*Nomadic Culture and its Comparison with the Sedentary Culture and Conflicts*", (iii) "*Dynastic and Kingdom*", (iv) "*Life in Village and Cities*", (v) "*Professions and Means of Livelihood*", (vi) "*Classification of Science*".

The titles of the books are the indications of author's extent of closeness with the social and political analysis. He was the first man to give clear conceptions about the formation and collapse of a state.

➡ Theory of States : He opined that nature forces man to unite socially and politically. Thus a state is built by nature. It gradually grows, matures, it becomes clearly noticeable and finally collapses. In the 19th century, Ratzel was influenced by this concept, and gave his famous theory on state system.

➡ Determinism : He beautifully explained the influence of climate on the distribution

of population. According to him, the areas close to the equator is less populated because of excessive heat; population is denser within 64° north and south of it; further north and south, population density decreases because of low temperature. He also explained the influence of climate on human activity, nature and instinct.

➡ Formation and Evolution of Settlement : He nicely explained the causes of formation and evolution of settlement. He correctly opined that fertility of land and its closeness to the sea attract man to form a settlement. Gradually habitation spreads with the increase of population, thus villages are slowly emerged as towns. These develop new social and economic relations, division of labour, difference in the supply of resources and the nature of demands and in this way society is changing from one stage to another.

4.3. A GLIMPSE OF THE CONTRIBUTIONS OF ARABIAN GEOGRAPHERS DURING MEDIAEVAL PERIOD

Arabian geographers made remarkable contributions to different branches of geography. Initially they were influenced by the Greek Philosophy and their ways of learning. Later, they succeeded in forming their own tradition and convention. Their contributions are as follows:

Table: 4.1 Contributions of Arab Philosophers in Geography during Mediaeval Period

Areas / Fields	Contributors	Contributions
Astronomy	Al-Battani	Book '*De Scienta Stellerum – De numeris Stellerum et motibus*'.
		Annular eclipse.
		Deduced orbits of planets and moon.
		Theory on new moon.
		Actual solar orbit.
	Al-Biruni	Explanation of Tide in connection to astronomical events.
		Book '*Al-Tahdid*'; Origin of universe
		Book '*Harkatah-al-Shams*'; Relative movement of sun.
		Book '*Qunun-al-Masudi*'; Solar and Lunar eclipse.
Mathematics	Al-Battani	Solved complex trigonometric and mathematical problems. Application of mathematical knowledge for calculating tide, planetary positions, determing direction and location during expedition.
Cartography	Al-Idrisi	Detailed World Map.
	Al-Battani	Solved many problems of Orthographic Projection.
Concept of earth	Al-Biruni	Book '*Risallah*': difference in the length of day and night at different places on earth.

	Al-Masudi	Surface of earth is round not flat.
	Al-Idrisi	Removed misconception on Indian Ocean and Caspian Sea.
Regional Geography	Ibn Battuta	Travelled 75,000 miles for 28 years. (Egypt, Syria, Iraq, Persia, Arabia, Asia Minor, Caspian Sea, India, Maldives, Ceylon, Sumatra and China).
	Al-Biruni	Full regional account of India.
	Al-Idrisi	Book *'Al-Kitab-al-Rujari'* and *'Nuzhat-al-Mustaq-fi-Ikhtirag al-Afag'* and *'Amusement from him Who desires to travel around the world'* (1154): Described economy, topography and cultural attributes of various regions of Asia and Africa.
Social, Political and Historical Geography	Ibn Khaldun	Book *'The Muqaddimah'*: Muslim views on history, society and political affairs.
		Theory on 'State'.
		Origin and evolution of settlement.
	Al-Biruni	Book *'Risallah'*: Full account of Islamic economy, agriculture, soil and politics.
	Al-Masudi	Interpretation on the rise and fall of Nation.
Climate Study	Al-Idrisi	Realistic division of world into climate zones.
	Al-Masudi	Description of monsoon climate.
		Formation of cloud by evaporation of water.
	Ibn Battuta	Torrid Zone (equatorial zone) is habited by few tribes.
Geomorphology and Physical Geography	Al-Biruni	Erosional plain along coast of Caspian Sea.
		Origin of fertile Gangetic plain.
		Causes of flood.
		Description of world topography – Himalaya as a backbone of world landform.
Environmental Determinism	Ibn Khaldun	Influence of climate on distribution of population.
	Al-Masudi	Environmental influence on society.
Human Geography	Al-Biruni	Book *"Rilah"*: gives detailed account of contemporary Islamic life pattern.
	Ibn Khaldun	*"Civilization, Geography and Anthropology"*, *"Nomadic Culture and its Comparison with the Sedentary Culture and Conflicts"* and *"Professions and Means of Livelihood"* contribute a lot in this field.