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Founders of Modern Geographical Thought

After the Great Age of Discovery, two leading German scholars, viz., Alexander von Humboldt and Carl Ritter made valuable contributions to the fields of basic sciences, humanities and arts. The foundation of geography as a modern science was primarily laid by German scholars during the period from 1750 to 1850. The second half of this period, the time of Humboldt and Ritter, is known as the 'classical period of geography'. They lived at the same time in the same country – for over 30 years in the same city. Humboldt laid the foundation of plant geography and declared geography as a descriptive science, while Ritter is credited with introducing mankind into geographical studies – particularly humanity in relation to environment. He also opined that 'geography is not concerned with the individual plants but rather with the plant and animal cover'. He was the first to develop the concept of harmony in the interrelation of regional phenomena. He repeatedly emphasized the concept of the 'naturaganzen', i.e. unity of phenomena of many different categories. Both were contemporaries, and lived and worked at Berlin for more than three decades. These two scholars are regarded as the founders of modern geography although neither was trained as a geographer. In this chapter, a brief account of the contribution made by these scholars is given.

Alexander von Humboldt (1769–1859)

Alexander von Humboldt led the way in the expansion of geography in and outside of Germany. He was a scholar of great versatility, who contributed appreciably to the fields of geology, botany, zoology, physics, chemistry, anatomy, physiology, history, climatology, geomorphology and to all other branches of geography. He travelled about 4,000 miles (6,667 km) and in all his travels, however short, he made multitudinous observations. He performed all journeys with telescopes, sextants, cynometers (for measuring blueness of the sky), and barometers. With the help of these instruments, he measured

accurately the temperature of air and ground, pressure, winds, latitudes, longitudes, elevations above the sea level, magnetic vibrations, nature of rocks, types of plants and their relations to climate, latitude, altitude and human attitude.

Alexander von Humboldt

Humboldt was born in an aristocratic family in Prussia. His father expired in 1779 when he was only ten years of age. After getting education in classical languages, economics, finance, history, technology and mathematics, Humboldt started his career in the army, but his mother prevailed upon him to study economics and to compete in the civil service examination. Later on he studied at Frankfurt in the University of Gottingen, where he studied botany, geology and mineralogy. He was taught by A.G. Werner – the famous geologist – who put forward the hypothesis that all the sedimentary rocks of the earth had been formed by precipitation under water and had been deposited in layers during the great flood. His interest in geography started with his acquaintance with George Forster – who was on Cook's second voyage around the world. Humboldt also attended lectures in physics, chemistry and mining. In the summer of 1790 he paid a short visit to England in the company of Forster. In 1772 and 1797 he was in Vienna. In 1795 he made a geological and botanical tour through Switzerland and Italy. The death of his mother, on November 1796 (when he was 27 years of age) set him free to follow the bent of his genius. In 1792, he was appointed Director of Mines in Prussia. He studied the effect of different rocks on magnetic declination and published his first paper in 1793. He became keenly interested in the rock structure of the Alps and visited Bavaria, Austria, Switzerland and Italy. In 1797, he resigned from the government job and planned his journeys to the new and unexplored lands. In Paris, he learned the art of handling various instruments of measurement like sextant, barometers and aneroid barometers.[1] He is frequently presented as a pioneer without predecessor, a lone figure who explored Latin America and returned to establish the science of physical geography.

Adventures and Explorations (Latin American Expedition)

Humboldt had a gift for exceptionally sharp observation and in fieldwork he was unsurpassed. In 1798, Humboldt along with a French botanist (A.

Bonpland), reached Madrid (Spain). On his way to Madrid, he made daily observations of temperatures and altitudes. He was the first to make an accurate measurement of the elevation of the Spanish Maseta.

In their expedition to Latin America (South America) they got the support from the King of Spain. They sailed on 5 June 1799. From Madrid, Humboldt and Bonpland reached Cumana Port in Venezuela (Figure 6.1). Along the sea coast they went to Caracas and explored the Valencia Lake. He noticed that the Valencia lake had shrunk and fields for cultivation of crops had been developed on its flat banks. He attributed the shrinkage of the lake to deforestation of the neighbouring lands. He established a positive relationship between the forests and rainfall. The idea that more forests mean more rainfall still significantly persists.[2]

In 1800, Humboldt's expedition explored the Orinoco river and its tributaries and established the truth of its connection with Amazon. The banks and basins of this river were uninhabited. During the venture, Alexander and his colleagues suffered many hardships. They had only banana, wild fruits and fish to eat, and were exposed to the bites of clouds of mosquitoes, ants, equatorial insects, man-eating fish and crocodiles. Even under these adverse conditions, Humboldt did measurements and established exact latitudes and longitudes of places. From this virgin region, he collected thousands of plant and rock specimens, which were transported to Cuba. In November 1800, they returned to Cumana (Cuba) and studied the economy and society of the people of Cuba.

In 1801, Humboldt and Bonpland arrived at Cartgona (Colombia) and from this port they went to Andes, Ecuador and Peru (Figure 6.1). Humboldt gave a scientific explanation of crops and the influence of altitude, temperature and vegetation on crops. His description of the vertical zones of the Northern Andes is a classic. He also examined the numerous volcanoes of Ecuador and descended in the craters of active volcanoes to collect gases emanating from within the earth. Moreover, Humboldt climbed Mountain Chimborazo Peak (6,267 m.) a world record at the time. He also visited Bogota, Quito, Lima and Callo in the Andes Mountains (Figure 6.1) and observed the influence of altitude on human body. It was Humboldt who explained the feeling of dizziness as resulting from low air pressure.[3] In fact, this disease is due to scarcity of oxygen at high altitude.

Traversing the Andes southward, the explorers reached Lima. On the coast of Peru, guana bird droppings were observed which have great manural value. Moreover, the cold water current of Peru was also observed and recorded for the first time. The temperature and velocity of this current were measured. This cold water current was subsequently named as Humboldt current. In March 1803, the expedition sailed from Guayaquil to the Mexico Port (Acapulco). He travelled in the different parts of Mexico and observed the impact of landforms on the cultural landscape. Staying for a short period at

Philadelphia and the White House Washington DC, Humboldt returned to Europe on 3 August 1904.

The adventurous nature of Humboldt did not permit him to stay at one place and therefore in 1806 he made a visit to Vesuvius volcano (Italy). After its completion he wrote his experiences and observations in 30 volumes in French, which were subsequently translated into a number of foreign languages. This encouraged many young scientists to investigate the geography of unexplored areas of the world. In his writings, Humboldt attributed the cause of prosperity of the inhabitants of Mexico to their better utilization of land resources. The idea of digging a canal across the Isthmus was also put forward by him.[4] In 1827, Humboldt finally shifted from Paris to Berlin.

In 1829, Humboldt was invited by the Russian Czar to visit the city of St. Petersburg (Leningrad) where he was entrusted with the task of exploring the virgin lands of Siberia across the Ural Mountains. From Petersburg, Humboldt, on a horse back, travelled through Voronezh, Kazan, Bogosloski, Tobolsk, Tara, Bersk, Omsk and reached up to the border of Mongolia (Figure 6.1). While returning he passed through Omsk, Orenburg and Astrakhan and made a survey of the coastal lowlands of the Caspian Sea. Throughout the Siberian expedition, a regular record of temperature and pressure was kept. On the basis of these observations, it was inferred that temperature on the same latitudes varies moving inward from the coast. It was on his advice that a number of meteorological stations were established by Czar in different parts of Russia. It was after this expedition that a world map showing isotherms was prepared for the first time. The concept of *continentality* was also established by Humboldt. Moreover, the term 'permafrost' was coined to explain the frozen characteristics of the Siberian soils. It was after this venture that the word 'climatology' appeared in geographical literature which deals with variations of atmosphere, temperature, humidity, barometric pressure, winds, atmospheric purity and the degree of visibility.[5] Thus, he contributed richly to a variety of fields. His major concern was, however, to correlate the physical environment with the human and organic phenomena. While dealing with man-nature interaction, he included man and his works but did not give adequate weight to man as the major determinant. Nevertheless, he portrayed towns, villages, fields, crops and transport linkages as elements of landscape. He also developed the concept of mountain sickness or soroches.

Looking closely at the rocks of the Andes, he decided that A.G. Werner was quite wrong about the origin of rocks and that granites and gneisses and other crystalline rocks were of volcanic origin. Humboldt made comparative study of Spain and Cuba. He attempted to develop a general picture on the distribution of average temperatures in the world in relation to the distribution of continents and oceans.

Alexander von Humboldt thought an approach to science was needed that could account for the harmony of nature among the diversity of physical world. For Humboldt 'the unity of nature' meant that it was the interrelation

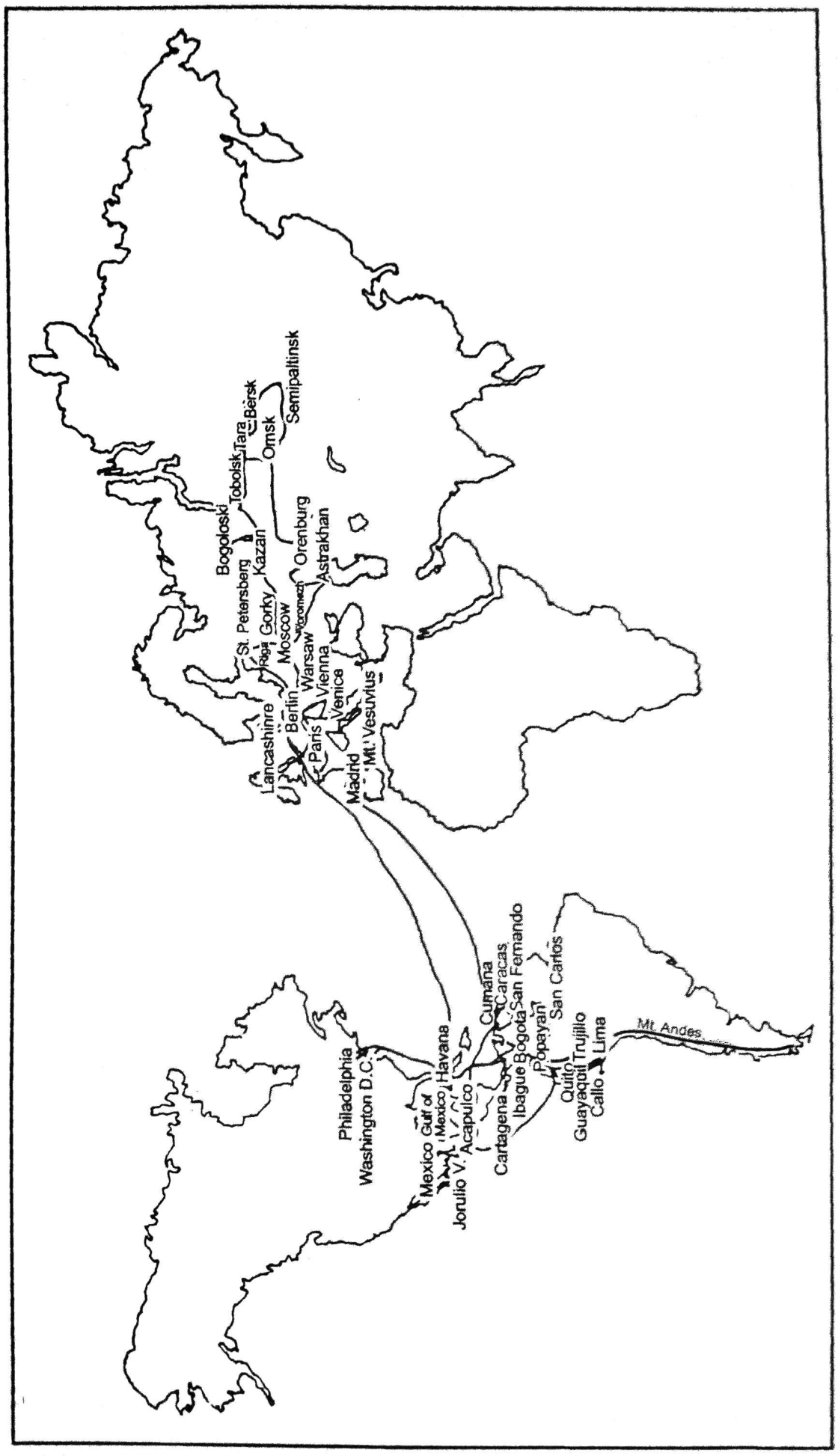

Figure 6.1 Humboldt's Travels in Europe, Russia and Americas

of all physical sciences – such as the conjoining between biology, meteorology, and geology. He viewed nature holistically, and tried to explain natural phenomena without the appeal to religious dogma.

In 1845, Humboldt's monumental work *Kosmos* was published, and was well received all over the world. It was later on translated in a number of foreign languages. *Kosmos*, a comprehensive account of the travels and expeditions of Humboldt, was written with the following four objectives: (i) the first is the definition and limitation of physical description of the world as a special and separate branch of knowledge; (ii) the second is the objective content, which is the actual and empirical aspect of nature's entity in the scientific form of a portrait of nature; (iii) the action of nature on the imaginative faculty and emotion becomes an incentive to nature studies through the means of travel, description, poetry, landscape, painting and display of contrasting groups of exotic plants; and (iv) the history of natural philosophy and the gradual concept pertaining to cosmos as an organic unit are dealt with. In brief, Humboldt's objective in writing *Kosmos* was to develop a universal science. Religions, he insisted, offer three different things to mankind: a lofty moral idealism, which is common to all religions; a geological dream regarding the origin of the earth; and a legend concerning the origins of the religion. He never mentioned the word 'God' in his writings.

He planned to write a series of books about the world with the following objective: Give a scientifically accurate picture of the structure of the universe. He saw nature as a whole and man as a part of nature. Humboldt believed that all the races of man had a common origin and that no race is necessarily inferior to the others. For the formulation, he thought that observation had to come first as he was believer of inductive method.

So far as the subject matter of *Kosmos* is concerned, in the first volume there is a general presentation of the whole picture of the universe. The second volume starts with a discussion of the portrayal of nature through the ages by landscape painters and then continues with a history of man's effort to discover and describe the earth since the time of ancient Egyptians. The third volume deals with the laws of celestial space which we would call astronomy. The fourth volume concerns with the earth, in which Humboldt considered man as a part of the earth.

While dealing with the subject matter of geography, Humboldt coined the term 'cosmography' and divided it into uranography and geography. In his opinion, uranography is the descriptive astronomy which deals with celestial bodies. Geography, on the other hand, was confined to physical geography which deals with the terrestrial part. Geography, according to him, is the description of the earth which deals with the interrelationship of phenomena that exist together in an area.[6] He was a pioneer of physical geography.

He considered nature as an organic whole born out of harmonious interrelationship between all living and non-living objects existing together in particular territories. He believed in 'unified universal science' encompassing

of all physical, biological and social sciences. The foundation of universal science was the main objective of his *Kosmos*. He focused on geography as the discipline concerned with both inorganic as well as organic phenomena on the earth's surface as an interrelated entity. He advocated the concept of *zusammenhang* (hanging together). He was the pioneer of the concept that 'man everywhere becomes most essentially associated with terrestrial life'.

Humboldt believed in the inductive method and emphasized the importance of empirical method of research. He also made comparative study of the different geographical regions, especially that of the steppes and the deserts. He gave importance to geographical representation of data on maps and the utility of maps for geographical studies. He believed in the unity of nature and accepted the idea of inherent causality (causal connection).

Humboldt believed that all the races of man had a common origin and that no race is superior or inferior to others. Moreover, he stressed the need of casual observations of nature in the field and of careful measurement of observations. It was an approach towards theory-building and model-making.

In brief, Humboldt sought answers to a great variety of specific questions. For example, he attempted to develop a general picture of the distribution of average temperatures in the world in relation to the distribution of the continents and oceans. The influence of altitude in the tropical areas on plants, animals and human life was also studied by him. Humboldt concentrated largely, though not exclusively, on physical features, climate and vegetation. About the use of 'natural', he was the follower of Kant. The word 'natural' in its broadest sense included all the phenomena observed outside the observer's mind or the objective reality. It is because of these contributions that he is considered not only the founder of plant geography and climatology but also modern geography. Humboldt thus was the last master of universal science.

Humboldt made substantive contribution to systematic geography (Cosmos) and laid stress on the unity of nature. Ritter appreciated the classic work (*Kosmos*) of Humboldt, but 'being an agnostic, he (Humboldt) did not write a word of praise for the Creator (God)'.

Much is not known about Humboldt's private life which remains a mystery because he destroyed his private letters. He never married, but and enjoyed all the earthly pleasures according to one of his travelling companion (Francisco Jose Caldas), Humboldt formed emotional attachment to men. He accused him of frequenting where 'impure love reigned'. On 24 February 1857, Humboldt suffered a minor stroke. On 6 May 1859 he died quietly in Berlin at the age of 89.

Carl Ritter (1779–1859)

One of the contemporaries of Alexander von Humboldt and a scholar of diversified interests was Carl Ritter. He is also known as one of the founders of modern geographical thought. He was a dedicated fieldworker and believed in empirical research. Moreover, Ritter was a teleologist and had a strong belief in God and was not an agnostic like Humboldt.

Carl Ritter

Ritter had a vision of an ordered and harmonious universe. Thus, his approach was teleological.[7] As a teacher, he made it clear to his pupils how God's plan was revealed in the harmony of man and nature.

Ritter was born on 7 August 1779 in Berlin. His father was a physician who died when Ritter was only five years old. After getting his early education in a school at Schnepfenthal near Gotha through non-formal methods (advocated by Rousseau), he was taught by G. Salzamann and Guts Muths. At the university level, he opted for Greek and Latin and read history and geography widely. With his pupils Ritter made frequent trips around the city of Frankfurt and created in them keen interest for field studies. Later on, he reached Switzerland and Italy to make on the spot study of their physical and cultural landscapes. It was in 1807 that Ritter met Humboldt for the first time. Ritter was highly impressed by his versatility in observing natural and human phenomena in different parts of the world. In 1814, Ritter joined the University of Gottingen and studied geography, history, pedagogy, physics, chemistry, mineralogy and botany. In 1818, Ritter was appointed as Professor of History at the University of Frankfurt. After one year as Professor of History and Geography at the gymnasium in Frankfurt, Ritter was given the double position in the military college and the University of Frankfurt. Subsequently, when the first chair of geography was created in Germany, he was made as the first Professor of Geography in 1820 at the University of Berlin. He founded the Berlin Geographical Society. He served the department of geography of Berlin University for 39 years. In 1859, he breathed his last – the year in which Humboldt also expired and Darwin published his *Origin of Species*.

Ritter, in his class lectures, emphasized the point that geography is not a dry gazetteer of names of places, rivers, mountains, and trade routes. It is a subject of great importance which deals with man-nature interrelationship. He also developed the concept of 'unity in diversity'.[8] Ritter was chiefly concerned with studies of human geography. He believed, as did Vidal de la Blache much later, that earth and its inhabitants stand in the closest reciprocal relations, and one cannot be truly presented in all its relationships without the other. Hence history and geography must always remain inseparable. Land affects the inhabitants and the inhabitants affect the land.

Ritter declared geography to be *'Erdkunde'* or an earth science, which deals with local conditions and embraces the attributes of place with respect to

topical, formal and material characteristics. The first attribute was topographical, i.e. it deals with natural divisions of the earth surface. The second included the distribution and movement of water, sea atmosphere, and the base of human life. The material conditions were described as the geographical aspect of natural history; this covered the distribution of minerals, plants and animals.[9]

As stated above, the scientific stance of Ritter was teleological (Greek *teleos* = purpose). Teleology seeks to understand events in relation to their underlying purposes. Teleological explanations are therefore often regarded as the opposite of mechanical (scientific) explanations, where the phenomena and observations are understood as outcomes of prime causes such as the 'laws of nature'. In the first volume of *Kosmos* (1845), Humboldt speaks of 'Ritter's great and inspired work'. He wrote of his *Erdkunde*, 'is to proceed from observation to observation, not from hypothesis to observation'. About the relationship of various facts of the earth, Ritter opined: 'We must ask the earth itself for its laws'. He was influenced by W.F. Hegel (1770–1831). He studied the working of nature in order to understand the purpose behind its order. His view of science sprang from his firm belief in God as the planner of the universe. He did not regard the shape of continents as accidental but rather as determined by God, so that their form and location enabled them to play the role designed by God for the development of human kind. Ritter regarded 'the earth as a whole as an 'organism' and the continents as 'individuals' or as 'organs' '. Ritter, a teleologist, was the first who made a major effort in modern times to divide the earth surface on universal consideration. Though his teleological approach was rejected as it was not scientific.

Ritter was also the founder of comparative method in regional geography.

Thus, according to Ritter, geography is that branch of science which deals with the globe in all its features, phenomena and relations as an independent unit and shows the connection of this unified 'whole' with man and with man's creator.[10] He claimed that the central principle of geography is 'the relation of all phenomena and forms of nature to the human race'. He makes the rhetorical claim that geography as the science of earth (in the sense of natural philosophy of cosmology) reaches far beyond the real objectives, namely, the description of the earth as the home of man.[11]

Ritter was the first great opponent of what may properly be called 'armchair geography'.

Principle of Unity in Diversity

The fundamental principle evolved by Ritter was 'unity in diversity'. According to him, there is a fundamental unity in the biotic and abiotic components of habitat in which man sculptures his cultural environment. In such an approach, all the physical and cultural components of environment are taken into consideration and their interrelationship is established in understanding the geography of an areal unit. This is a regional approach. Unity in

diversity means that every naturally bounded area is a unity in respect of climate, production, culture, population and history. Ritter makes few deterministic observations; he seldom does more than repeat what Humboldt had already written and gives the same synthetical accounts of continents. The merit of Ritter's work comes not from his description of the continents but from his ability to deduce these from a system of laws governing 'the concept of regional association of terrestrial phenomena at various levels over the earth's surface'.

Ritter's method is said to be deductive because it deduces new conclusions from fundamental assumptions or from truths established by other methods. So far there is little to distinguish Ritter's ideas from Humboldt's and in the spatial arrangement of terrestrial phenomena, there is marked similarity between the two colleagues.

Ritter introduced many stimulating ideas. He stressed the idea of land and water hemispheres, the distinction between the rates of heating and cooling of land and water, the difference between the northern and the southern hemispheres in their proportion of land and water. He averred that there were differences between the continents. Africa had relatively short and the most regular of all coastlines and its interior had least contact with the sea, whereas Asia was better provided with sea inlets, but the interior had little marine contact and Europe was the most varied of all, with an ease of approach along its shoreline of comparatively great length. He identified each continent with a different race, having a different colour.[12] For example, according to him, Africa is a continent of black people, Europe of white people, Asia of yellow people and America of red people. This overgeneralization created much obscurity in the world of geography. About the universal and regional laws in geography his opinion was that 'the earth itself must be asked for its laws'. In brief, Ritter's theme was that the physical environment was capable of determining the course of human development. His ideas were strengthened by the publication of Darwin's *Origin of Species* in 1859 with its emphasis on the close relationships of organism and their habitat (environment).

Ritter emphasized repeatedly that he was teaching a 'new' scientific geography, in contrast to the traditional 'lifeless summary of facts about countries and cities, mingled with all sorts of scientific incongruities'. Ritter saw all of his studies of 'the earth and man as revealing more and more of God's plan'.

Ritter considered the earth as the home of man. He stressed that 'the outer shell of the earth is the area of geographical study and not the entire earth'.

Ritter is known for his *Erdkunde*, which conceptualized regional geography as contrasted with systematic geography of Humboldt.

Erdkunde

Ritter's monumental work is entitled as *Erdkunde*. *Erdkunde* is a comprehensive German word which stands for science of the earth in relation to

nature and history. Ritter remarks that 'the earth and its inhabitants stand in the closest reciprocal relations and one cannot be truly presented in all its relationships without the other. Hence, history and geography must always remain inseparable'. Land influences the inhabitants and in turn the inhabitants transform the landscape. In Europe, for example, only in the east (Russia), there was uniformity of geographical features and uniformity of history. But, in the west, there was variety of environment and history, and in the diverse south (Europe) too history was rich, studded with the efforts and achievements of Egyptians, Carthageans, Greeks, Romans, Gauls and Iberians.[13] In *Erdkunde*, he advanced the theory of the north-west movement of civilization in Europe.

The first two volumes of the *Erdkunde* were intended to be followed by a study of history. Between 1817 and 1859, he completed 19 volumes of *Erdkunde* but these volumes cover only Africa and parts of Asia. In spite of the fact that he lived long, he was not able to finish his work of Europe.

Through his writings, Ritter tried to prove that the earth is made for man: 'As body is made for soul, so is the physical globe made for mankind'. The most logical development of Ritter's work is to be found in the writings of the geographers who studied the interaction of the various phenomena – relief, climate, vegetation, and man in a particular area.

The major geographical concepts of Ritter may be summed up as follows:[14]

1. Ritter conceived geography as an empirical science rather than one based on deduction from rational principles or apriori theory.
2. There is a coherence in the spatial arrangement of terrestrial phenomena. Areal phenomena are so interrelated as to give rise to the uniqueness of the areas as individual units.[15]
3. Boundary lines, whether wet or dry (such as rivers or mountains), were instruments for understanding the real purpose of geography which is understanding the content of areas.[16]
4. According to Ritter, geography was concerned with objects on the earth as they exist together in an area. He studied areas synthetically, i.e. in their totality.
5. Ritter holds a holistic view with respect to the content and purpose of geographic study, and the whole study was focused on and culminated in man.
6. He believed that the earth was an organism made, even in its smallest details, with divine intent, to fit the needs of man to perfection. He was a teleologist in his approach.

Both Humboldt and Ritter laid great stress on the unity of nature, though one has a scientific and other a religious approach. They both believed that the ultimate aim of research was to clarify this unity and, in this respect, were in accord with the idealistic philosophies of their time. Humboldt did not pursue idealism in the same way as Ritter, for his concept of the unity of nature was more aesthetic than religious. In this respect he had more in common with Goethe than

with Ritter. Unlike Ritter, he saw no reason to explain unity and order in nature as a God-given system to further humanity's development. Humboldt was very much engaged in the gradual development of natural science, and his greatest contributions lay in the field of systematic physical geography. Ritter was, on the other hand, to a considerable extent a regional geographer.

Even during the period of Humboldt and Ritter geography was still not related to a specific discipline. In fact, geography remained an umbrella concept for a variety of expeditions and other activities within the natural and social sciences, to a large extent supported by geographical societies. Some of the important geographical societies which promoted the cause of geography are given below in a chronological order:

1. The Societe de Geographie de Paris – 1821
2. The Gesellschaft fur Erdkunde zu Berlin – 1828
3. The Royal Geographical Society London – 1830
4. The Geographical Society Mexico – 1833
5. The Geographical Society Frankfurt – 1836
6. The Geographical Society Brazil – 1838
7. The Imperial Russian Geographical Society in St. Petersburg – 1845
8. The American Geographical Society – 1852

The main work of these societies was to give support for expeditions and for their publication of yearbooks and journals which included maps and other material from expeditions.