VOLUME ONE • PART ONE

The History of the Filipino People

TADHANA

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FOUNDATIONS OF FILIPINO CULTURE

(ca. 300 million B.C. to 1565)

Diwata the supreme ruler and his beloved son Demowata lived in heaven. One day Demowata . . . asked his father for another place to live in. Diwata took a piece of heaven and gave it to his son . . . And Diwata called this piece of heaven banwa, *that is to say "earth." And he created a sun to light the new home of Demowata. Then he divided the earth into two by making a circle. Inside the circle he made the land, and outside was the water. He filled the land with trees, plants and animals. He named the beautiful place* Langkonoyan, *that is to say a garden of happiness. . . Then Diwata molded clay in the likeness of Demowata, but the heat of the sun caused it to crack. So he took the molded clay to the river and sprinkled it with water. And immediately the crack split the clay into two creatures which were exactly alike—the first human beings in the world.*

Pagbal dig Banwa Bo Gona Gataw *(The Creation of the World and the First Human Beings). As told by Kilino Tangkasan, a* Subano *Baliyan (Medicine man) from Sinuti, Zamboanga del Sur. Translation and comments by Virgilio Resma in "A Subanu Myth,"* Northwestern Mindanao Journal.

PART ONE

ARCHIPELAGIC GENESIS

Ka romiyonda ma ilin
Na palao sa Songgiringa
Ka miyarunding a barat
A bugabong sa Dansalan
Ka miyabangkawit i lin
Na layagun a Bumbaran
Ka miyagayao riganda
I karagandang o kunug
Na so kini dansal iyan
Ko kadaya o marandang
Na miyakapagudara
So dagoong go so linog
A mini awong a kunug
So dandan o pagilidan.

And hanged completely
Are the hills of Songgiringa
It is shielded now by a storm
That roars as it dashes,
And it has changed
Far off Bumbaran.
For struck now
Nature's forces
And as they came,
To this wide place
They clashed
The storm and the earthquake
And the sound reverberated
Into all the places around.

—Bantugan Bayok.
Translation by Abdullah Madale

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THE PHILIPPINES IN THE REMOTE PAST

The history of any human society comes after an unimaginably long process of evolution involving the entire universe. Before written records of man's social nature began to differentiate one tribe or race from another, all matter shared a faceless, volatile existence. From the mysterious "soup" of which the early universe consisted to the hard material of the planets and finally to varieties of life, all things were bound in a common voyage through thousands of millions of years across interminable space. The notion of history came to man only when distinct differences became perceivable as particular races and communities in this huge retinue through time and space stepped off, as it were, in various directions to chart individual destinies.

Particularization itself as the immediate predecessor of every national history comprises a distinct process of evolution. Part of this process is the formation of the setting upon which a par-

ticular national history would be laid. On the larger canvas of the universe the picture that this process evokes consists of galaxies and constellations flung here and there, perhaps by a combination of accident and physical laws, through a limitless abyss. On the lesser scale of the planet earth, the process of particularization comprises the evolution of continents and islands, the homes of various groups of men themselves slowly evolving into distinct societies.

The history of the Filipino people would take place on one such distinct setting.

The beginnings of this history, the story of the co-existence of a people and an archipelago, lie far beyond the earliest songs and chronicles celebrating life, as racial memory recalls it, upon these islands. The home of the Filipino people has yielded to recent generations a geological record in some ways more exciting than oral traditions or artifacts, such as utensils and tools associated with tektites that fell some 700,000 years ago. The Philippine setting, the essential physical element of the State, formed and grew through a span of time which reached farther into the past. In that immense period, which reduces recollected human existence in the archipelago to a heartbeat, the land and seas, the mountains, plains and streams were formed and life stirred in plants and animals.

Fortunately for modern man, it has become possible, at least to some extent, to "read" the record that those dark and distant eons left of themselves. It is a record, however, that consists not of the handy and convenient script of man but of the tracks of nature in evolution or in upheaval. By means of the stars, the galaxies and constellations in the sky, we are now able to begin to comprehend the character and composition of the universe, including its beginnings which would otherwise have been lost forever in the deep recesses of time and space. From their arrangements in the enormous world about us and from the chemical elements distributed in once puzzling patterns in those stellar objects, in meteorites and in rocks, we discern a story of the forbidding past.

The evolution of the earth and of the Philippine archipelago before man appeared on the planets is thus recorded in the soil and rocks; in the remains of life that have lain buried in them

for countless millenia; in the chemistry and distribution of the rocks; in the magnetic patterns of the seafloor and the intensity and movement of heat from the interior of the earth; and in the compositions of the oceans and the atmosphere. Geologic events and environments of the past may also be glimpsed through processes taking place in the present. Today's earthquakes, the distribution of volcanoes, oceanic ridges and trenches, and changes in the composition of rocks in the earth's interior are likewise part of that continuing record, phenomena which man could seek to explain and in so doing contribute some more to the unravelling of the past.

This particular method of attempting to recapture the past is based on the principle known as *uniformitarianism,* which conceives the present as the key to the past. The principle recognizes that long after they had ceased to manifest themselves directly, certain natural conditions reveal themselves again by means of the peculiar traces they leave behind, which then become their identifying marks. For example, coral-bearing rocks such as limestone existing today in temperate regions far from the sea indicate that in the past tropical seas covered the areas where these ancient reefs are found. The presence in these ancient reefs of traces of life-forms now extinct also permits a glimpse of the environments in which these early varieties of life thrived. The principle of uniformitarianism, introduced in 1795 by James Hutton of England and popularized by John Playfair and Sir Charles Lyell during the 19th century, has been fruitfully applied to studies of the Philippines and continues to this day to facilitate attempts by Filipino and foreign earth scientists to obtain more knowledge of Philippine geology. These men of science have thus been led to read Philippine pre-history in the record etched through the ages upon the rocks.

This first part in the series that attempts to discover the roots of the Philippine nation is a layman's account of the origin of the Philippine archipelago based on such scientific effort to decipher the past. Although the topics covered in this part are not ordinarily the concern of historians, many of the events that took place in the geologic past are relevant today and will quite likely have similar value in the future. Energy and mineral resources are part of the national patrimony, and government planners today see in them increasing importance in national

development. These resources took form during the period covered here; their presence in vast quantities in the Philippines has been recognized by ancestral Filipinos, by Chinese chroniclers, and by the colonizers who subsequently came to these islands. Today, many of these resources—chiefly oil, coal and geothermal energy—are being drawn from the earth to keep Philippine progress in motion. The well-being of the nation depends to a large extent on the development of these primeval indigenous resources.

The archipelagic character of the Philippines has been an essential element in the cultural growth of the nation. The multitude of islands comprising our environment possess characteristics which they share with the settings for a few other national communities in our neighborhood, like Indonesia and New Guinea. In such tropical island-sea environment evolves a culture quite unlike that which thrives in continental and land-locked nations. In the archipelagic environment men must live with an endless coastline and bear up with a nightmare that this geographic feature creates, a constant, nationwide exposure to pirates, smugglers and aggressors. This extreme peril is compensated, however, by the breathtaking scenery offered by a coastline that rings the entire land, and by the easy growth of external trade.

The tropical environment which the Philippines enjoys has furthermore supported diversity, abundance and heterogeneity. Thus, in the tropical archipelagoes of the Western Pacific, there have evolved over the centuries a wide variety of life forms. While thus nourished in the common amniotic sac of the tropics, social groups nevertheless for long periods grew independently of others. Locked in their own corners of the archipelago by dense forests, mountains and seaways, they developed diverse cultures and languages.

The islands strewn around our part of the Pacific also possess other features in common, such as volcanoes and earthquakes, so that in the Philippines as in the others periodic manifestations of intense volcanic activity are part of the environment in which men, in the past and in the future, must live. Thus, church builders in the Philippines during the Spanish period learned to adapt their construction methods and materials to this characteristic of our environment. Today, designs for dams and power

plants are drawn likewise with particular attention to the threat of frequent or intense earthquakes.

Though thus regarded as a potential source of catastrophe, volcanoes are also associated with beauty and mystery. Numerous legends about Philippine volcanoes reflect their majestic or preternatural qualities. Some of these volcanoes, notably Makiling and Arayat, are for instance celebrated in legend as the abodes of gods and goddesses. A volcano in Mindanao, Mount Apo, which is also the highest mountain in the Philippines, has with its sulphurous emanations and occasional eruptions inspired a charming mythology among the Bagobos, who have lived in its neighborhood since ancient times. To this day, these tribes regard the volcano in fear and awe as the dwelling place of demons whom they call *buso*. Mayon Volcano, whose periodic eruptions have caused great destruction in Albay, has on the other hand fetched praise from worshipful brochure writers as "the world's most perfect cone."

In addition to witnessing these and other aspects of Philippine geology and geography, this attempt to revisit the distant past will also strive to provide some understanding of how the Philippine environment evolved. This environment, with its perils and bounties, acquired its present attributes over a period covering hundreds of millions of years. The complex landforms and the archipelagic environment that produced and supported varied species of life are the result of geologic events which took place through such awesome span of time. Although the Philippine archipelago shares common features with neighboring land areas, it also has unique characteristics derived from the peculiar location of the Philippines at the western edge of the Pacific and the Australian landmass.

Among the diverse ecological communities that developed in this section of the planet there evolved plants and animals unique to the Philippines. Industrialization and modernization have begun to disturb the ecological conditions in which these Philippine wildlife thrived, endangering plants and animals peculiar to our environment. In this attempt to reconstruct the past from geological records, it will be possible to see which plants and animals lived in the environment of the early Filipinos. We will also glimpse changes in Philippine life as they took place during the prehistoric times. This opportunity to see the past in the process of

evolution is important, for an appreciation of how the past contributed to the present would give man now and in the future some of the competence and the respect for nature that he needs to endow himself with habitable surroundings.

To organize this record of the origins of the Philippine archipelago as part of Tadhana's first volume, "The Foundations of Filipino Culture," information was drawn from published and unpublished material. Of the new information, much was obtained from facts and conclusions yielded by the intensive oil exploration effort that has been undertaken in the Philippines since 1973. I have also benefited from preliminary drafts of a report, "Geology of the Philippines," being prepared by the Philippine Bureau of Mines and Geosciences. Explorations for energy and mineral resources have uncovered new grounds in Philippine geology. It must be stated at once, however, that there are until now many gaps in our knowledge of Philippine geology, so much so that some concepts concerning the origin of the archipelago are themselves still evolving. With the vast amount of information that has become available in the last few decades, however, the general framework of our knowledge of geology is now firmer than it was in the past.

The study of Philippine geology drew livelier interest during the period of American colonization, but it had commenced and even achieved a respectable place long before this period of Philippine history. A dissertation for a Ph.D. degree submitted by I-chi Hsu to Washington University in 1971 therefore undermines the truth about geological studies of the Philippines, creating the wrong impression by declaring that "in the last year of the 19th century, Becker (1899) published the first paper on the geology of the Philippines." To correct this inaccuracy, which leads one to believe that earth sciences in the Philippines began only during the American occupation, it is now necessary to review the development of earth sciences in the Philippines before the 20th century.

As their myths and legends clearly indicate, even early Filipinos took profound interest in cosmogony, in the origin of the earth and sky, the sun, moon and stars, the beginnings of land and sea, of mountains and lakes. Anthropomorphic elements are common in these narratives recounting, with the uncanny intuition of ancient man, how matter and life began in the Philippine

environment. The Nabaloi people of Benguet, for instance, confidently explain the origin of the sulfur springs in Daklan and the gold mines in Benguet. Their legend about the latter, in particular, exhibits a charming primitive wisdom. In the legend, an old patriarch, Otot, was buried on a cliff by his son, Bangan. On the grave a plant of golden color grew rapidly; on the tenth day fruits ripened on its branches, and Bangan, who alone could pick them, found each one to consist of gold. The roots of the tree became the gold in Suyok; the base of the trunk, the gold in Tabio; the top of the trunk, the gold in Antamok.

From the legend one may glean that the ancient Filipinos were aware of the veinlike pattern of gold in the ground and that they had marked in their own time the mining districts in Benguet. The antiquity of mining is also reflected in place names such as Gambang, a name for copper in Benguet; Balatoc, the word for gold in the dialects of northern Luzon; Mambulao, from *bulao*, the Bicol word for gold; Paracale, referring to excavators of the trenches used in placer mining; Batobalani, a Filipino word for magnetic iron ore; and Uling, coal. Place names referring to volcanic activity, such as *mainit* (hot), *magaso* (smoking), *caua* (cauldron) also indicate early Filipino awareness of volcanism.

Observations on earthquakes and the development of mineral resources in the Philippines are coeval with the development of geology in the West. In 1669, Nicolaus Steno, a Danish physician in the court of the Duke of Florence, published *De solido intra solidum naturaliter contento dissertationis prodromus*. In this book, Steno demonstrated that tonguestones, objects with roughly triangular shape found in the cliffs of Malta, were similar to sharks' teeth. These stones, along with sea shells and other remains of marine life discovered in rocks hundreds of meters high and away from the sea, indicated that in the past these rocks lay in sea water.

The studies of Steno on layers of rocks in Tuscany led to the formulation of three basic laws of geology, namely, superposition, original horizontality and lateral continuity. These laws concern rocks formed from the consolidation of particles deposited in basins, such as lakes and seas. Within the basin, the rocks stand layer by layer, the layers in the bottom having been deposited first and those on the top coming last. Hence the law of superposition.

The layers are originally deposited in a horizontal position; tilted layers therefore indicate that at some point earth movements disturbed the original horizontality. Within the basin, the layers normally have lateral continuity, so that if layers today are abruptly truncated, the discontinuity is ascribed to erosion or to displacement of the layers by structures known as faults. These are fractures in rocks caused by a violent or powerful movement.

The three fundamental laws resulting from Steno's studies marked the beginning of systematic reconstruction of past geologic events. During the decades prior to the formulation of these laws, earthquakes and volcanic eruptions in the Philippines were described by Spanish observers. Three volcanic eruptions in 1641 are recorded in a report of the Society of Jesus published by Raymundo Magisa. Four years later, more earthquakes occurred in the Philippines, descriptions of which were published in 1649 by Alonso de Paredes.

Mineral and geothermal resources are likewise of public knowledge even in this early period of Philippine history. Official correspondence in 1643 report the abundance of gold in Camarines Norte. By 1671, Laguna was already famous for its hot springs and in 1727, the area where these proliferated was named Los Baños, after the roman baths constructed there.

At the turn of the century, the organic origin of fossils established by Steno became widely accepted. Fossils from the Philippines, along with minerals and bivalves, are discussed in a work of George Joseph Camel published in 1706. In the middle part of the 18th century, more volcanic eruptions and earthquakes visited the Philippines. Father Melchor de San Antonio gives an account of the 1743 earthquakes in Tayabas (now Quezon) and Laguna. The eruptions of Taal Volcano in 1749 and 1754 are reported in detail by Fr. Francisco Buencuchillo. The Boletin Oficial of 1756 reports the eruption of 1754 and the earthquakes of the same year. The 1766 eruption of Mayon is reported by the governor of Albay in 1767. Towards the later part of the 18th century, in 1781, an expedition of the Royal Academy of France measures gravity. Also in this year a license to exploit the iron deposit in Santa Ines, Morong (now Rizal) is granted by the Spanish crown to Doña Isabel Carreaga.

An increasing number of papers on earth phenomena, geology and mineral resources, rocks and fossils of the Philippines ap-

pears in the 19th century, many of them reflecting the popular concern over earthquakes and volcanism. In 1814, Yldefonso de Aragon reports on Mayon Volcano, whose eruption that year buried many areas, such as Budiao where coconut trees were engulfed by lava up to their crowns, and Cagsawa where only the church steeple is visible today. Twelve thousand people perished in this eruption. Other eruptions of Mayon, in 1894 and 1897, are reported by Miguel Saderra Maso and Jose Corona, S.J., respectively.

In 1856, eruptions gave birth to the volcanic island of Didicas. N. Wood reports in *Nature* the birth of the new volcano in 1871. Earlier, in 1843, Alfred de la Marche had written two relevant papers, one on the hot springs of Los Baños and Taal Volcano and another on Taal Volcano. In 1861 and 1862 Francisco Antonio Llanos, S. J., wrote on the geology of Mount Arayat in Pampanga. The same Jesuit scholar recovered a meteorite in Pampanga and described the object in 1862. Six years later, Gabriel Auguste Daubree would show that the meteorite found by Llanos was a chondrite, a meteorite containing spherical shapes called chondrules.

Chemical analysis of the products of volcanism has been consistently undertaken. In 1814, Francisco Peralta analyzed volcanic ash in Albay. In 1876, an analysis of the thermal water of Taal and Los Baños was reported by Don Jose Centeno y Garcia. In the report, the water composition of Los Baños appears as follows:

Calcium chloride	60 grains
Magnesium chloride	2½ grains
Sodium chloride	26 grains
Sodium sulfate	4½ grains
Iron oxide	½ grain
Insolubles (silica)	8 grains

Measurements of water temperature show a temperature of 84°C. In Taal, the water of the interior lake is reported to have the following composition:

Sulfuric acid	2.98 weight %
Hydrochloric acid	3.16 weight %
Iron oxide	1.0 "
Silica	1.94 "

Magnesia	9.2	"
Lime	0.08	"
Soda	1.02	"
Water	90.52	"

Centeno y Garcia also records the Tiwi hot springs as having a temperature of 108° C.

One of the scientists who wrote on Philippine volcanoes and earthquakes, Ferdinand Blumentritt, the friend of Dr. Jose Rizal, wrote a series of papers on these topics from 1880 to 1885. A monograph on earthquakes and volcanoes of the Philippines was published by Alexis Perrey in 1860. Other writers who observed Philippine earthquakes are G. de Berard and S. Kneeland, both of whom wrote on the 1852 earthquake in Manila; Enrique Abella y Casariego, who described the earthquakes in Luzon in 1892; and Father Miguel Saderra Maso, S. J., already cited, who wrote a monograph on the seismology of the Philippines in 1895.

In addition to the interest in earthquakes and volcanoes, there has also been an extensive search for mineral wealth. Ancient gold and copper production in the Philippines was augmented by the discovery of the deposits in Mankayan, Benguet in 1833. Centeno y Garcia in an 1876 report speaks of 24,249 quintals of copper produced in Mankayan between 1864 and 1874. Carl Zerrener (1869) analyzes a copper-bearing mineral from Mankayan and Albin Weisbach (1876) introduces the name *luzonite* for this mineral, after the island of Luzon.

Besides copper, gold and iron, other metals were discovered in the Philippines during the 19th century. Father Justo Azofra reports the presence of mercury in Dumarao, Capiz in 1819. In 1848 the Inspector of Mines records the presence of lead, antimony and sulfur in Casiguran, Albay. Coal in the Bicol peninsula is reported in 1842. Antonio Hernandez, in 1854, writes about coal in Cebu and elsewhere in the Philippines; Centeno y Garcia, thirteen years later, also writes on the same mineral.

The first monograph on the geology and mineral resources of the Philippines written by a mining engineer was published one hundred thirty-nine years ago. Though noteworthy as a pioneering effort, this work contained only a brief description of the country's resources. Thirty-six years later, a more exten-

sive memoir was published by Centeno y Garcia. This memoir covers the physiography, volcanoes, hot springs and the geology of selected localities, such as Lepanto in Mankayan; Pangasinan; Pampanga; the coal-fields of Cebu; and the Bicol peninsula. Centeno y Garcia also reports on his observations and studies of particular mineral resources: copper, gold, iron, coal, mercury, lead, antimony and sulfur.

Papers dwelling on specific metals were written by other scholars during the last century. Jose del Barco in 1850 reported on iron deposits in Bulacan; Jagor, in 1862, wrote on copper in the Philippines. Marquez de Caicedo published in 1880 a monograph on gold deposits in the Philippines. The American colonists merely carried on the intense work thus devoted by earlier scholars to Philippine geology and physiography, work which, including a memorandum published in 1898, antedated the 1899 paper on the geology of the Philippines mentioned in the dissertation of Hsu.

Besides the work of Centeno y Garcia, other interesting publications on Philippine geology appeared more than one hundred years ago, such as the account of the travels of Feodor Jagor which was published in 1873. Five years later, Dr. Richard von Drasche published his description of the geology of Luzon, which discusses the area surrounding Manila Bay, Pampanga, Arayat, Zambales, the Central Cordillera, Benguet, Bontoc, Laguna de Bay, Taal, Tayabas, Camarines Norte, Camarines Sur and Albay. Analysis of a tuff (a volcanic rock) in San Mateo, Laguna (now Rizal) is given by von Drasche:

Silica	51.69	weight %
Alumina	20.11	weight
Iron oxide	9.36	"
Lime	6.26	"
Magnesia	4.85	"
Potash	1.21	"
Soda	1.97	"
Loss on Ignition	7.07	"

Also present in this work are six photographs, taken through a microscope, of rocks found in the Philippines. In several localities such as Abra and Paracale, von Drasche observes metamorphic rocks such as gneisses and talc schist. These are products