INFLUENCE OF THE GEOLOGICAL STRUCTURE OF PALESTINE ON THE DEVELOPMENT OF JEWISH HISTORY





THESIS

THE INFLUENCE OF THE GEOLOGICAL STRUCTURE OF PALESTINE ON THE DEVELOPMENT OF JEWISH HISTORY.

by

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Supplementing a course of lectures on the Geology of Palestine given during the Session of 1904-5 at McGill University by Frank D.Adams, Ph.D., D.Sc. F.R.S. &c. &c.

THE INFLUENCE OF THE GEOLOGICAL STRUCTURE OF PALESTINE ON THE DEVELOPMENT OF JEWISH HISTORY.

All modern science endeavours to bring the different facts of which it is cognizant into the relation of cause and effect, and as the human mind by its very constitution is ever seeking for the cause of the phenomena with which it is acquainted, the recognition of this relationship is most important in the study of all branches of science, as it lends to the science a peculiar facination which would otherwise be wanting: - fust as the French Revolution is made more interesting and is best explained by following the currents of influence contributory thereto back to their origins in French and European life or the study of the individual flora and fauna of a country in connection with the environment which has modified them and the particular genus from which they have been derived.

While, however, modern science has endeavoured to explain the history of a people in its relation to other contempory peoples and to trace the causes contributory to particular events to their source, up to the present time little attention has been paid to the physiography of the country as influencing the particular nature, customs, character, manners and temperament of a people and the explanation of the peculiar physiography and physiographic controls of the country by the various **biologic** changes and movements back of them .

No branch of study is more facinating nor throws such a flood of light upon the history of a nation or people as that of the physiography and geology of the land in which they dwell both as modifying their temperament and customs and in controlling their life and development both in their isolation from and communication among themselves and with other peoples. the past the The three great histories of Greeks, the Romans, and the Childgen of Isreal, with their customs, conquests, birth, rise and decay, can only be adequately understood by a knowledge of the lands in which these various peoples have dwelt. The stragetic importance of Athens, Rome and Jerusalem can only be understood by an accurate knowledge of the physiography , and geology of the places where they are situated. In no country, moreover, has the physiography of the land such and influence upon the history of the pople as in Palestine.

An accurate knowledge of the physiography and geology of a country is necessary, moreover, to elucidate the records of its history and to obtain the view-point of the historian. Ten chapters of the book of Joshua alone **dre** devoted to a description of the country and the names and situations of its towns and villages are enumerated with a precision that compels minute investigation: numerous allusinns in the prophetical writings too, also require accurate knowledge of the country. Furthermore the physiography and geology of the country may be used as an aid in explaining

THE NATIONAL CHARACTER OF THE PEOPLE. Every nation Ι is influenced by the surroundings in which they dwell, by the scenery of the country, its fertility, its rocky barriers, its high mountains, its water supply, and its natural highways. The land, the climate, its situation, all influence and modify the people which inhabit it in a way such as few other influences can do; It is a mould in which the national character is cast, by which it is modified beyond which it cannot develop itself. Who can doubt but that Sinai with its grandeur, its solitude, with the thunders reverberating and reechoing through its vast valleys was a fitting preparation for the second birth of the nation, or that Palestine by its central sutuation and its almost completer isolation from the civilized powers of the ancient world, by the variety of its scenery and resources and by its contrast from the desert and the Egyptian and Mesopotamian Empires helped to give rise to a faith which its varied character and numerous points of contract with the world has made it almost universal.

II. THE DIFFERENT FORMS OF EXPRESSION USED BY THE PEOPLE. It is a well known fact that a nation dwelling in the desert has different forms of expression, a different peetry, a different language from that of a sea-coast people. Greece is a well known example of the influence of the character

of the land upon the expressions of its poetry, its philosophy, its worship. This must also be looked for with regards to Palestine, but inasmuch as Palestine possesses a variety of scenery, of sea, and desert, mountain and plain, and extremes of climate from the Artic snow of Lebanon to the torrid heat of the Jordan Valley with the flora and fauna characteristic thereto, its language possesses a variety and picturesqueness, its poetry and charm and universality which commends it alike to the Esquimaux in the frigid Arctic and the African in the torrid Sahara and which also gives to the Bible that charm of variety so much in contrast with the arid dryness of the Koran or the tiresome moralities of the writings of Confusius III. PARTICULAR EVENTS. As the battles of Marathon and Thrasymenus are best illustrated by a view of the localities themselves, so, too, conquest of Palestine by Joshua the numerous battles in the vale of Esdraelon, the main course of the armies, the use of cavalry and chariots , or of infantry, the panics and successes of battles, are best explained by a knowledge of the physiography of the land. Moreover the boundaries of the different tribes and a selection of the capitals are best explained when viewed in connection with the configuartion of the land.

IV. Again the physiography of the land furnishes the test of the accuracy of the records from which we take the history itself. Nothing is harder than for a stranger to describe a locality accurately and few evidences are more conclusive

than the description of an eye-wittness of the locality itself with contemporary allusions thereto. The precision with which the scenes are laid and the accurateness with which they fit into the narrative is a presumption of the truth of the other matters referred to. The marked correspondence between the scenes of the Sinaitic mountains and the events of the Isrealitic wanderings does not render certain but lends a presumption to the truth of the whole narrative. In like manner, to m et in the narratives of the gospels transient yet precise allusions to the localities of Palestine suggests the presumption of their early origin inasmuch as while Palestine was still familiar it was not accessible to later writers. The statements of the Rabbis that Hebron could be seen from Jerusalem, or the music of the temple could be heard at Jericho must have been written by persons unfamiliar with the localities. The harmony between the life of Joshua, the scenes of his battles, his failures and successes though slight are true indications, we are dealing not with myths but with actualities. Besides natural phenomena, moreover, the evidence of natural phenomena may explain many of the events which would have appeared to the witnesses of that time as supernatural and miraculous; these are when evidenced by geological testimony additional proof of the correctness of the marrative, a change indeed in our mode of conceiving of the event may be needed but the event is indisputable.

V. The physiography may also be useful as illustrating the scenes of the different events. There is as Palgrave in his History of Normandy and England, well observes a satisfaction in treading the soil and breathing the atmosphere of historical persons or events like that which results from familiarity with their actual language and with their contemporary chronicles, and this pleasure is increased in proportion as the events in question occurred not within perishable or abolished buildings, but on the unchanging scenes of nature, on the Sea of Galilee and on Mhunt Olivet rather than at the foot of Gerezim or the House of Pilate. These sites are better identified and stand out with greater vividneds and relief if we know the physiography and the geology of the land.

VI. The physiography of the land here explains the practical and proverbial use of geographical terms and gives them fuller meaning. As Milman says in his History of Christianity "This panguage of poetic incident, and if I may so speak, of imagery was the vernacular tongue of Christianity universally intelligible and responded to by the human heart throughout many centuries. The incidents were so ordered that they should thus live in the thoughts of men: the revelation was so adjusted and arranged that it might insure its continued existence." The topography of the Holy Land explains the universality of its imagery. It explains why such expressings, such as the "passage of the Red Sea", "Waters of Strife", "Wilderness of Life", "Rock of Ages", "Mt. Sinai and its terrors", "View from Pisgah", "Passage of Jordan", the "Rock of Zion "," Shades of Gehenna", "Lake of Genessaret with its storms", etc. / have become the household imagery of Christendom.

The foregoing are some of the ways in which a knowledge of the physiography or topography and geology of the Holy Land aid in the interpretation and elucidation of the events in the history of the Jews and explain how their history was modified and moulded by the physiography of the land. To sever the physiography from the history is as Dr. Stanley \emptyset admirably expresses it "to view the frame without the picture, the skeleton without the flesh, the stage without the drama."

As by the foregoing it is seen that the explanation of the development of Jewish History is dependent in a large measure upon the physiogramic and topography of Palestine and partly of Sinai in like manner the physiography is best explained by the geology of the land as a framework upon which the physiography and topography and the explanation thereof rests and my plan in the following pages will be to outline briefly the geology of Palestine.

First describing the various formations and roughly their occurrence then to outline in order the different geological changes that have taken place giving rise to the present topography and physiography; then to describe the various physiographyc features of the country with its influence on the drainage, scenery, and climate of the country and suming up the physiographic control over the people, their habits and customs, and how it has influenced and modified their history and lastly to briefly deal with particular events in the history of the people, the question as to whether the land was always under the same physiographic controls as at present with celucidation and illustration from the facts then previously adduced.

GEOLOGY.

While much remains yet to be investigated to supplement the work of Lartet, Hull, Fraas, and Diener, yet enough the main chapters of the geological sequence of events is known to explain the present existing relation of the country, I therefore propose to discuss the geological formations of the country and to describe the geological events from the more remote to the present age and then to describe the present features of the country of which the geological events are explanitory.

GEOLOGICAL FORMATIONS.

Recent	(1) (2) ((3)	Sand Hills : Desert Sands Alluvial deposits of the Nile and Jordan Valleys. Gravel of the Arabah Valley
Recent to Pliocene	(1. (2. (3. (3.	 Raised beaches: Gravel and sand with recent marine shells etc. Ancient deposits of the Salt Sea; marl, sand and gravel of the Jordan-Arabah Valley. Old lake beds: Gravel, marl and loam of the valleys of Arabia-Petraé
Miocene	1.	Nicolian sand-stone of Jebelel Ahmar, near Cairo.
Eocene	(1. ((2.	Calcareous sandstone of Philistia probably of upper Eocene Age. Numulite limestone with chert.

Cretaceous	 (1. Cretaceous limestone with chert. (2. Nubian sandstone (Neocomien or Cenoman- ien or Petra sandstone).
Lower Carboniferous	(1. Wady Nasb limestone (2. Desert sandstone and conglomerate
Metamor	phic Rocks.
Archean	(Granite, gneiss, honblendic, micaceous, and chloritic schists etc.
Volcani	c and Plutonic Rocks.
Recent & Tertiary	Basalt and Dolorite
Older Primary	Granite, Sy e nite, Porphyry, Felstone, Porphyrite, Diorite, Basalt, Tuff,& Agglomerate •

(a) The Archean. The most ancient rocks are found to the South of Palestine proper. They consist of massive chrystalline rocks rising through the stratified formations which form the mountainous group of the Sinaitic Peningula and the escarpments of the mountains of Edom stretching along the Eastern shore of the Gulf of Akabah and of the Valley of the Arabah. All along this valley on the eastern side they are found rising from below the more recent formations at various intervals as far north as the base of Jebel es Shomarah on the east side of the Dead Sea. Two small isolated strips rise through the Cretaceous beds near the centre of the plateau of the Tîh. These rocks consist of schists, amphiboles, chlorites, talcs, gneiss,

and eruptive granites. These rocks which form the floor of all other geological formations are referred to by Fraas as belonging to that period of the earth's history known as the Archean by Sir William Dawson to the period known in America as the Laurentian. 3 "The positive evidence of the region, however, only suffices to "prove that they are more ancient than the Carboniferous and while "there might be a suggestion of their being metamorphosed Silurian it is extremely doubtful whether the Silurian basin ever extended over any portion of the Arabian or North African Region " These Archaen rocks appear to form two great series, the Metamorphic, hik which are the oldest of all upon all the other formations have been laid down, and the newer series, plutonic or eruptive of which the greater part of the mountain ranges appear to be formed. These first are met with in the Wady Nasb shortly after leaving These ancient metamorphic rocks consist in decend-Ayun Mousa . ing order largely of hornblendic, chloritic, and talcose schists with grey gneiss and grey granite, which beds are penetrated by porphyry felstons and melaphyre which are of more truly igneous origin either in the form of dykes of of masses so large as to form ridges and mountains of themselves and are characterized by their depth of color, the red and purple tints being more common and these are in turn traversed by dykes of diorite , diabase and The central heights of Serbal are formed from these basalt. first mentioned intrusions. These rocks consist essentially of

felspar of a reddish color porphoritic from the presence of crystals of felspar, quartz, mica, and hornblend with chlorite and epidote as accessories.

Besides these great solid eruptive masses which solidified from a molten state there are to be found along the escarpments of Edom and Moab great volcanic masses wid. probably of contemporary age of the red granites and porphyries already mentioned and composed of beds of agglomerates, lapilli, tuff, associated with others of trap which may have been subaerial or submarine accumulations while the other greater masses were being formed in the crust of the earth. These volcanic rocks are best exposed in the Wady Haroun at the eastern depression of the Ghôr and the sides of the Jabel esh Shomar above the Dead Sea.

(b) Lower Carboniferous Beds. These beds were first recognized by Mr. H. Bauerman in the Wady Nasb in 1863 and later revisited by the Palestine Expedition of 1883. The lower formation to which the name Desert Sandstone is applied, consists of soft sandstone of purple, red, and variegated colors, often conglomeritic and brecciated. Its thickness varies owing to the fact that it is laid down on an uneven floor formed of the older crystalline rocks from whose waste it was itself largely accumulated, consequently where the ancient beds was most depressed the sandstone is thickest, and in some cases where the ridges of the older crystalline rocks protruded above the surface it is altogether absent. Examples of this may be seen in the Wady Zelegah in the Peninsula of Sinai and the other among the hills north of Mount Hor where the "sandstone beds occupy a hollow in the granite and por-"phry which forms their general floor and terminating in "the cliffs on either side." The sandstone varies in thickness from 100 to 200 feet in the Wadies Nasb, Sarabit and Lehean.

Lying immediately above the "Desert Sandstone" are strata consisting of dark grey limestone which weathers to brown exceedingly hard and brittle and largely fossiliferous. This formation is seen in the Wadies Nasb and Serabit and throughout the Wadies of El Biyar El 'Ain and Et Tihyeh and among the hills of Moab east of the Ghôr at Lebrusch where the rock is about 150 feet in thickness.⁽⁹⁾

The fossils of this formation consist, -

(a) In the Desert Sandstone of Lepidodendron mosai-

(b) In the limestone of corals, crinoids and

brachiopods, namely, -

Anthozoa. Syringopora ramulosa, Zaphrentis. Polyzoa. Fenestella plebia.

Brachippoda. Spirafer striatus, Spirafer attenuatus and Productus pustulosis.

Orchis Michelini.

(c) CREMACEOUS. An enormous gap occurs between this formation and the formation previously described which is represented in Europe by the Upper Carboniferous Permian, Triassic and Jurassic, indicating that the region was at that time above sea level and subject to denudation.

The lower beds of this formation are what are called the Nubian Sandstone by Russegger or the "Cenomanian of D'Orbigny," though cometimes confounded with the Carboniferous sandstone by which it is underlain. Throughout the greater part of Arabia Petrasa and the Valley of the Nile it constitutes the older of the most recent formations which rest on the crystalline and metamorphosed rocks of extreme geological antiquity. This Nubian Sandstone at Assouan and the first Cataract of the Nile may be seen reposing directly on the schist

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gneiss and porphyry which are the fundamental rocks of this part of the globe.⁶ This Nubian Sandstone is remarkable for the depth and variety of its coloration due to the various pigments of iron, copper and manganese. This sandstone is seen in the Wadies Hamr, Zelagah and Biyar and from thence to Badiet et Tihas far as the escarpment of Turf er Rukn, from thence along the flanks o[°] the Arabah Valley to Nagb el Salni where it disappears beneath the plain and may be traced on the opposite side of the valley to Petra, on the cliffs bordering the Dead Sea and along the Jordan Valley as far as Wady Zerka {The occurance of this formation may be more fully seen on the colored map appended.}

The formation of this Nubian Sandstone indicates the submergence of extensive areas under the water or the estuaries or restricted basins, but the next formation above, the Cretaceous limestone indicates a widening of these basins until almost the whole was submerged and the waters of the ocean extended from India to Gibraltar and from the northern mountains of Europe and the British Isles to the central regions of Africa. It is possible that some of the Sinaitic and Arabian mountains may have been dry land during this period but the whole of \mathcal{O} Palestine and Syria were submerged.

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These beds of Nubian Sandstone are followed by a grand series of white marl and of limestone, with bands of chert which are often found spread on the surface of These latter beds are at the base of Palestine the soil. from the escarpment of Badiet et Tih at the south to the base of Lebanon on the north and also on the plateaus of Edom and Moab to the east of the Jordan-Arabah Valley. These Cretaceous beds are terminated by the grand escarpment above the border of the Gulf of Suez continuing along along the border of the Sinaitic mountains to the Valley of the Arabah and which are largely superimposed by the beds of Nubian sandstone, though this formation is sometime absent. The absence of the Cretaceous beds and the Nubian sandstone in many places is accounted for by the fact of the irregularity of the surface of the original crystalline rocks which allowed the sea to recover the lower places while the higher places remained above sea level for a longer period.

The general succession of the Cretaceo-Nummulite series in descending order are as follows,-

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Eccene beds(1) (1.White chalky limestones and marls, with occasional bands of dark flint or chert Country round Beersheba, Tel el Milh, Sebaste Nabulus &c (Nummulites, bivalves and gasterpods.)

Doubtful... (2.Compact, grey, yellow, red and variegated limestone with marble beds(Jerusalem) with Ammonites, Baculites, Turritella and Hippurites.

> 3. Hard grey yellowish limestones sometimes dolomitic with beds of dark chert or flint often in considerable quantity. This member is the most important of the Cretaceous series.

4.Soft white limestone with rare bands Crehaceous beds. of chert.

5.Grey calcareous marks passing downwards into shales with selenite and crystals of salt.

6. 'Nubian Sandstone' Red and variegated sandstone with a base of conglomerate. the ductures of this Cretaces - humalitie cenies is from 3 ous to 4000 for molecular of abund 1000 feet for the humalitie ber.

EOCENE. The Cretaceous limestone merges gradually into the Nummulitic limestone above mentioned which is undoubtedly of Eocene age, in such a manner that it is almost impossible to separate the beds of the two systems It is often wanting in the centre of the tableland of western Palestine but it has been observed at the top of the escarpment which bounds the Isthmus of Suez, on Mount Carmel and on the flanks of Lebanon. Wevertheless although there is this apparent conformity there must hav been a considerable lapse of time between the formation





of these two series of beds and inasmuch as there is a complete change in the fossils between the beds of the two formations. Zittel has demonstrated the same $\neg - \varphi$ thing in Egypt and Nubia.

In Philistia we find a softer forma-UPPER LOCENE. tion of calcareous sandstone which was recognised for the first time at Tel Abu Hareireh between Beersheba and Gaza, extending throughout the whole of the plain of Philistia with the exception of the places where it is hidden by the recent or Pliocene beds. This formation is overlain in certain places by terraces of shelly gravel or sand of later date. The harder limestone of the tableland of Central Palestine dip under and pass below this formation along the borders of Philistia and along a line extending to the base of Mount Carmel. This softer formation has been more deeply denuded than the harder limestones of the central tableland. The strata of this formations consists of particles of quartzcemented by carbonate of lime stained yellow by the presence of oxide of iron, the rock being generally porous, distinctly bedded and uniform in character. No faults have been seen but they are traversed by many joint planes.



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Hull assigns this formation to the Upper Eocene it being older than the sand and gravel of the sea border which is supposed to date back to the Pliocene there being no evidence of Miocene beds in Palestineand the rock being traversed by joint planes and having a solid character similar to the Cretaceo-Nummulitic limestone.

MIOCENE. There are no Miocene beds in Palestine and its borders. With the close of the Eccene period the land appears to have arisen from the sea, the Miocene period in Palestine therefore must have been one of disturbance and elevation of faulting and denudation ands such other geological processes as contribute to the making of hill and valley of plateau and plain. Though absent however in Palestine beds of Miocene age have been observed in the Isthmus of Suez and in certain places in Egypt and Nubia by Zittel, Fraas and Dawson.

PLIOCENE AND POST-PLIOCENE. The deposits of this period consist of (1) raised beaches and sea beds in the maritime districts and of (2) lacustrine deposits in the interior.

Throughout the regions bordering the Mediterranean and Red Seas as wellas the coasts of Africa and Asia





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there are clear indications that after the Cretaceo-Nummulitic limestone deposits had been raised during the Miocene period and the leading features of the land, main valleys and coast lines had been formed by denudation the whole was again submerged to a depth of about 220 feet below the present level of the sea. The beds from which this inference is drawn are found in the Valley of Tel Abu Hareirch, throughout the whole of the plain of Philistia, on the borders of the Gulfs of Akabah and Suez and at Jebel Mokattam above Cairo. They are about 220 feet above the present sea and have all the phenomena characteristic of old sea beaches. These beds with few exceptions contain fossils of species living in the adjoining sead at the present day, namely, -Cerithium erythronense, Strobus tricornis, Nerita crassilabrum, Pectunculus pectiniformis, Pectunculus violaceus Purpura haemastoma, Murex brandaris &c.

The inland representatives of this period consist iof the old lake terraces of the Jordan-Arabah Valley and the valley of the Sinaitic Peninsula and on the banks of the Dead Sea and the Lake of Galilee the most remarkable of which having a height of nearly 600 feet above the

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present level of the Dead Sea.

On the western side of the Sea they consist of beds of salt underlain by beds of gypsiferous marl and on the other side by beds of gravel. These beds correspond to the maritime beds already described and at the period at which they were laid down the waters of the Sea of Galilee were continuous with those of the Dead Sea and formed one lake a hundred and thirty miles long. Around the porders of this old lake were laid down various terraces of different heights and consisting of beds of gravel silt and marl which were laid down as the dessication of Mr.Hull enumerates three of these the lake proceeded. terraces with various heights above the Dead Sea the upper terraces having an elevation of from 630 to 600 feet, the second 520 to 250 feet and the third 200 to 130 feet and lower still there is an alluvial flat liable to floods with a height of from 90 to 20 feet. There are however some older terraces than those of the Jordan Valley which were found by the Palestine Exploration Expedition of 1883-1884 at 'Ain Abu Werideh in the Wady el Arabah to the south of the Dead Sea consisting of white marl, sand and clay having a level of nearly

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Here west. Pales p. 94 1400 feet above the Dead Sea and containing fossils of Melanopsis Saulcyi, Melanopsis bucciroides, Malanopsis eremita and Melania tuberculata and as there is no barrier between these beds and the Dead Sea it is evident that the level of the waters reached this height at one time or the same level as that of the raised beaches of the ω coast bordering the Mediterranean.

TERTIARY VOLCANIC RCCKS. There are abundant evidence of volcanic activity in Palestine extending probably from the Miocene to very near the present age. These evidences are especially abundant in the district around the Tiberias and the adjoining district of Moab. Sea of The lavas composing the flows over these parts consist largely of basalt and dolorite rich in iron and poor in silica. Considerable masses of this basalt and dolorite cap the tableland of Moab and descent the beds of the deept gorges leading down to the Dead Sea showing evidenc that they were extruded subsequent to the hollowing out The most important traces of volcanic of these gorges. activity in this district are those of the Wady es Safieh, Jebel Shihan and Jebel Attarus. 47 There appears

to be no indiciations of volcanic activity on the Western side of the Gnor or Dead Sea.

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To the east and north of the Lake of Tiberias in the region of the Hauran, the Ledja, the Jaulan and Et Tulùl the volcanic phenomena assumes its grandest proportions. There are great sheets of lava and volcanic cones and the appearance of the district is similar to the volcanic region of Central France. Lartet referring to this region (the land of Bashan of the Bible) says it contains three great tracts of volcanic rocks, that of Et Tulul lying to the east of Damascus, that of the Hauran and Ledja to the south of the city and that of the Jaulan extending from the Valley of the Hieromax along the eastern shore of the Sea of Tiberias and Jordan Valley to the base of Mount Hermon. The rocks of this region consist of augitic lava vesicular and scoriaceous and spreading over large tracts of country from the mounths The region is sterile and of craters in the interior. forbidding and is described by Ali Bey who crossed it in 1807 as "Etant une région d'un aspect infernal" To the

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west of the Lake of Tiberias there are important masses of volcanic materials, the most important being Jebel Safed and there are similar masses near Nazareth. These volcanic masses seem to have issued on the lines of fault planes somewhat parallel to the great fault of the Valley of Esdraelon.

As to the age of these outbursts it is difficult to actually determine. The streams flow along the depressions hollowed out in the Cretaceous and Eocene limestones and must therefore be older than the hollows and it is probable the earliest manifestations occurred during the Pliocene and continued throughout the Pluvial. Evidences of shifting and moving around these masses may be seen in the earthquake which destroyed Safed on New Years Day 1837 which destroyed the town and 4000 lives were lost. From the hot springs and mineral and sulphur waters and also from the presence of earthquake shocks the censation of volcanif activity may have taken place within historic times. From the foregoing brief synopsis of the geological formations it will be well to a fuller understanding of the physiography of the country to briefly summarise in order the principal changes that have taken place within geologic time during the deposition of the sediments above described and which have given rise to the present topography.

(1) First we have a continent composed of Archean rocks of crystalline character of which we have the remains in the mountains of Edom and Sinai. This Archean crystalline basement extended into Northern and Central Africa and included the Arabian Desert.

(2) This Archean continent was partly submerged at the commencement of the Carboniferous period, at first under interior lakes, as evidenced by the Desert Sandstone, subsequently under the waters of the ocean as evidenced by the Carboniferous limestone. Then the region was again elevated and continued to be dry land until the commencement of the Cretaceous period. During this period the surface underwent great denudation. (3) The Cretaceous. The region was again submerged with the formation of great lakes and estuaries at the bottom of which was deposited the Nubian sandstone and later by a further sinking of the region the waters of the sea envelloped enveloped the whole country which remained submerged during the whole Cretaceous period. At the end of this period the ocean covered the greater portions of Europe, Asia and North Africa and during this period the beds of the Upper Cretaceous were deposited.

(4) Eocene. This latter period was terminated by a movement of the floor of the sea accompanied by a general rising though it did not dislocate the beds. At the end of this period there was another sinking of the bottom which continued until the end of the Eocene period. It was during this period that the nummulitic limestone was formed.

(5) Miocene. The preceding period was terminated by important movements of the earth's circumference ushering in the Miocene period. It was during this period that the greater part of the distinguishing physical features of the land were determined. The sea bottom was

elevated several thousands of feet above the sea and became dry land in many parts of this cld ocean. This elevation, however, meant enormous strains and the strata were not able to bear it and wholesale fractures were the result. Many parallel fractures occurred and in some cases the intervening rock between these fractures sank several thousands of feet. It is as if an arch were formed by the strata and then the keystone of that arch There is a notable instance of such a falling fell in. in of the keystone occurring in the plateaus of the Black Forest and Vosges in Germany and they have applied the name of graben to such a physical phenomena. These grabens do not appear to have been formed rapidly but the events were slow, the blocks on either side gradually rising with the gradual subsidence of the graben block. The greatest of these grabens is the Ghôr which includes the Valley of the Jordan, Dead Sea and Wady el Arabah on the South. The Valley of the Esdraelon and the Bekaa which separates Lebanon and Anti-Lebanon are also notable The graben of the Ghôr probably extends grabens. below the Red Sea and comes out in Africa as observed by Stanley in his travels in Abyssinia. The intensity

h. Dawson in the h. Dawson in the le ball, from no southing fils from July 1894 o lecture AT adam 19:14. Leven of this theng the sends and anothing Hitcheoche Repaired Space Barton Space Barton Space Barton Loc. Jond. 1889 In Strand Jord 2014 In Strand Jord 2014 of the forces at work in forming these grabens was very uneven, it is more vigorous in the north than in the south Lebanon being still the highest part of Palestine And it is a matter of note that the mountains of Moab and Judea dominate all Southern Palestine, moreover it is also interesting to bear in mind that the highest blocks lie next the deepest depressions and from Mt.Nebo one can get a view of almost the whole of Palestine.

The principal fault fractures are those of the east of the Ghôr which is of such magnitude as to explain almost the entire subsidence of the block on that side. On the western side the graben block was laid down by a succession of lesser parallel faults making terraces. Gutside the main fault there are minor ones, one of which ex lains the steep slope of the Jerusalem upland. These faults also offered opportunity for the molten masses below to extrude and the lavas North East of Jerusalem and the numerous vents east of Carnel, west of Damascus and in Northern Syria are with few exceptions grouped on lines of fracture, also the Hauran plateau. That these grabens are not yet complete may be inferred from historical accounts of the earthquake from which Amos dates his bock in the reign

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of Uzziah king of Judahand also from the ruins of such towns as Antioch ac and especially those on the edge of the graben such as Safed, Baalbec and Palmyra and that this activity has not yet ceased may be inferred from the numerous bitumen and hot springs in Palestine. This bitumen being probably formed by the carbonization of organic debris in the rocks by the heat of the lavas. and the ancient name of the Dead Sea "Lacus Asphaltites" gets its name from the bitumen which occasionally rises to the surface. Another great fracture is that along the coast of Palestine along which part has sank below the Mediterranean accounting for the even coast line and

a fun for Sue volxent bres Want of good harbors. All the beds laid down during the previous period were during this period broken and traversed by faults and joints the greatest of which faults was that which has been referred to, namely to the Jordan-Arabah depression extending from the Gulf of Akabah to the base of MD.Hermon. This was also a period of great denudation during which the chief valleys were formed part of which is dealt with late(under the title of Drainage.

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(6) PLIOCENE. At the end of the preceding period there was a new submergence and the land sank to a depth of from 200 to 300 feet below the level of the lake of the sea. During this period also was formed the Valley of the Jordan which reached its greatest extension during the following period.

(7) POST PLIOCENE OR PLUVIAL. Previous to this period the mountains of Lebanon were covered with perpetual snow and the glaciers descended to 4000 feet above sea level. The rainfall of Palestine and Arabia-Petraea was much greater than at present and the waters of the Jordan-Arabah lake reached their highest levels nearly 1290 feet above the Dead Sea. The progress of denudation and the formations of valleys was very great during this period and accounts for the number and largeness of the valleys which descend from the interior of the tableland of Central Palestine to the Valley of the Jordan and Dead Sea and also the size of the Wadies of the Sinaitic Peninsula.

(8) This is the last stage of the historic geology of Palestine and leads to the present time. The volcanic action almost ceases in the region of the Hauran and

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e changes many he news from the withers a finne whiles a finne alexance of the interne of the Jaulan, the climate becomes more sub-tropical, rain and snow diminish and the rivers approach near to their present condition. The great Jordan-Arabah Lake gradually aries up owing to the loss of rainfall and is transformed into three lakes that of Huleh, Galilee and the Dead Sea.

The foregoing is a brief historical summary which has led up and accounts for the present topography and physical conditions of Palestine.

It will be well now to delineate the salient physical aspects of the country which are the result of this long train of geological events.

The region under discussion may be divided into five distinct districts of different geological structure and contrasting strongly with each other.

(1) The first section is the maritime plain. It consists of a series of low hills from three hundred to four hundred feet high separated by valleys and alluvial plains and extending inward to various distances. North of Mount Carmel it includes the plain of Akka which is nearly level and extends from the Northern base of Carmel by Acre to Ras el Nakurah. This tract consists largely of alluvium and old sea beds and between Acre and the mouth of the Kishon there is a line of sand dunes piled up by the coast. To the south of Mount Carmel this maritime tract is narrow for several miles but at Caesarea expands and in the neighborhood of Ramleh extends inwards about fifteen miles, further south it expands to embrace Philistia and the large tracts of sand, loam and sandstone which slope upward on to the tableland of the Tin. This maritime district is composed of beds of calcareous sandstone probably of Upper Eccene upon which there are beds of sand and gravel with shalls of different species of the inhabitants of the sea adjoining. These probably may be referred to the Pliocene age or more recent. Along the line of many of the streams there is a rich, deep, brown loam which yields abundant crops of wheat and maize. One of these elevated sea shores is seen at Wady es Sheriah previously mentioned, at a height of 220 feet above the sea, and corresponds with those discovered by Oscar Fraas along the flank of Jebel Mokattan at Cairo.

The elevation of this maritime plain varies from one hundred and fifty to three or four hundred feet above the sea level. Along its eastern border the tableland of Judea rises abruptly where the hard Cretaceous limestone emerges through the calcareous sandstone of Philis-
Hull hear Pales \$ 8. aberen de Pales \$ 6. aberen de Seri \$ 145 tia which is especially well seen at Bab el Wady.

(2). The next great district is that o' the tableland of Western Palestine and the Plateau of the Tih. This plateau commences at the escarpment of the Badiet el Tin at the south and extends northward to Lebanon. It is bounded on the south by the Sinaitic mountains on the east by the Jordan-Arabah depression on the west by the maritime plain of Philistia. The average elevation is about 2200 feet above the sea. The Mosque of Omar at Jerusalem being 2393 feet. The plateau is formed almost entirely by limestone and is intersected by ramifying valleys which 'debouche' on the one side into the Jordan-Arabah Valley and on the other into the Mediterranean. To the south of the plateau the valleys do not contain streams but in the central part and towards the north streams supplied by springs for the most part, continually run down them. Throughout the plateau of Western Palestine there is a line of watershed which can be clearly traced from the ridge which separates the head waters of the Leontes from the Jordan down to Jebel Mukrah in the Badiet el Tih which accounts for the

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and the Mediterranean respectively.

(3) The third feature is that of the Jordan-Arabah depression, one of the most remarkable physical features of this or any other land. This commences at the end of the Gulf of Akabah and extends northward along the mountains of Edom and Moab and the Jaulan to the base of Hermon. This depression corresponds with the grand fault or system of faults which extends from Hermon to the Gulf of Akabah and probably under the Red Sea into Africa as evidenced by the beds which have been displaced for several thousands of feet. The greatest displacement has taken place in the vicinity of the Dead Sea and Mount Hor where the Cretaceous beds are found in juxtaposition on the west with the fundamental crystalline basement of the east. In the vicinity of the Sea of Galilee the displacement is not so great as on the border of the Dead Sea inasmuch as the Cretaceous beds are found on both sides of the lake. Sometimes they have blankets of basalt of a late date covering them.

This Jordan-Arabah depression may for sources of convenience be divided into two parts, -

tel 15 202 mote 111 5 202 fortz (a) The northern, stretching from the source of the Jordan to the southern end of the Ghôr and

The northern section is drained by the Jordan and

(b) the southern from the Ghor to the Aelanitic Gulf.

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its tributaries and throughout its length is bounded by abrupt cliffs and terrages on either side. The Jordan takes its rise in several springs issuing from Mount Hermon, from thence it descends to a shallow lagoon with its surface seven feet above sea level named Lake Huleh and from thence it makes a descent of 689 feet in a distance of 12 miles to the Lake of Tiberias which is nearly oval in form about fourteen miles long by eight miles broad. At the southern extremity the Jordan emerges from amongst lagoons and shallows as a clear stream and abounds in fishes and molluscs. On the north side rise the basaltic hills of Safed, to the east the volcanic plateau of the Jaulan dominated by extinct cones and craters. Polished pebbles of limestone, basalt and flint mixed with shells o? Neritina, Melania, Melanopsis, Cyrena and Unio form Leaving this lake it pursues a tortuous the strands.

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course a distance of sixty-six miles to the Dead Sea which is 1292 feet below the sea level thus giving a descent of 610 feet and from this sea it never issues forth being evaporated by the heat of the sun. On either side of the river Jordan and through which it has cut its course are alluvial terraces consisting of sand, gravel and calcarecus marl and containing fossiliferous shells of the genera Melanopsis and Melania of the species still living in the Lake of Tiberias. These terraces are continuous around the shores of the Dead Sea. The terraced hills formed of gypsiferous and saliferous marl lying on either side of the Dead Sea and called the Lisan and Khasm Usdum respectively are portions of terraces the upper surface of which reaches a level of 600 feet above the Dead Sea. From the base of the cliffs of Jebel Karantul to the fords of the River Jordan near Jericho three such terraces may be seen, the first being at a level of from 630 to 600 feet the second 520 to 200 feet and the third 200 to 130 feet and below them is an alluvial flat which is liable to be flooded whenever the The upper surface and outer margins of waters rise.

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of dessication which the waters of this valley have undergone. The Dead Sea occupies the deepest portion of this depression and is enclosed on all sides by terraced hills save on the north where it received the waters of the Jordan. The banks of this sea rise steeply on either hand those on the Moab side form a line of terraces composed of sandstone capped by limestone the western slopes being composed altogether of beds of limestone with dark chert except along the south western shore where the terraces of Jebel Usdum composed of beds of sand, marl and rock salt forms an advanced wall along the margin of the waters The length of this sea is about 47 miles long by 10 miles The Sea is divided into two parts by the El Lisan wide. (or Tongue) which juts out from the eastern shore and terminates in a cliff facing the west. The upper surface of this is about - 300 feet above the level of the surface of the Sea and consists of beds of marl with bands of gypsum and rock salt and clearly formed a

these terraces indicate successive stages in the process

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portion of the bed of the Sea before it reached its present level. There are no fossil remains on this promontory. The Sea itself is 1292 feet befor the level of the Mediterrenean and soundings have proven it to have a depth of at least 1050 feet. The southern boundary of this Ghör is formed by an incurved line of steep banks and cliffs composed of beds of gravel and sand resting on others of white marl or clay. At the upper edge these banks are about 800 feet above the surface of the Dead Sea and from their base extends an extensive plain descending in terraces to the slimy fields which are liable to be flooded.

The southern section, or the Valley of the Arabah commences where the Ghör ends and extends to the Gulf or Akabah a distance of about a hundred miles. It contains no sheet of water though after the winter season numerous streams pout into it. The surface of the valley is formed of sand, gravel, shingle and marl and its average breadth is six or seven miles. It is bounded by the range of Mt.Seir on the east and the escarpment of the Tih on the west. There is a great watershed about 45 miles from the head of the Gulf of Akabah which divides \$25 the valley into two sections.

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formations admirably. The more remarkable of these ravines are the Jabbok, Wady Mojib, and Wady Gharandel. Thermal springs also spring forth on both sides of the Jordan Valley many of them containing sulphur and other compounds in solution, one of the warmest of which is Yarmuk Chasm north of Um Keis or Gadara with sulphurous water and a temperature of 169 Fah. and Hammath near the western side of the Sea of Tiberias with a temperature of 143.3 Fah. and many others, and it is significant that these are situated near the line of fault as it presupposes that the waters are in contact with basaltic rocks which have retained portions of their original heat.

(5) The fifth district embraces the region of the Sinaitic Peninsula which is bounded on both sides by the Gulfs of Akabah and Suez and on the north by the irregular escarpment of the Tîh plateau. This region consists of a great multitude of rocks heights or sharp ridges breaking off in cliffs and precipices consiting of granite, porphyty and schist and divided by deep waterless ravines. The highest peaks Katharina Zebir has a height of 8551 feet that of Um Shomer 8449 feet that of Jebel Musa 7373 feet Jebel Serbal which is an isofated mountain to the west separated about twenty miles from the central group of heights rises like a rocky wall from the valleys at its base over 4000 feet and about 6734 feet above the Gulf of Suez. There are numerous springs at the case of these mountains but the chief source of water supply is the occasional thunder storms which burst on the mountains in December and January and sweep down the mountains with disastrous effect, a remarkable instance of one of which is reported by F.W.Holland in 1867 the 3rd of December when the dry bed of the Wady Feiran 300 yeards wide was converted into a foaming torrent 8 to 10 feet deep. The mountains of Sinai are composed largely of the ancient crystalline basement rocks of Arabia Petraea covered over with sections of the Cretaceo-Nummulitic rocks.

The foregoing physiographical outlines will serve to explain in large measure the drainage, scenery climate, and those various natural conditions which limit the activity of man in any particular region generally summed up under the term "Physiographic Controls" of the land.

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DRAINAGE. As soon as the Eccene sediments were raised above sea level they were attacked by rain and rivers and the deepening of the valleys progressed along the whole period of the block faulting. There must necessarily be also a structural water divide on sitter From the Western plateau certain streams would platean. flow towards the Mediterranean in consequence of the uplift of the plateau and on the other side certain would flow towards the Ghor or the Bekaa on account of the graben blocks, and into these grabens was gathered all the drainage from the surrounding plateaus. These rivers lengthened their valleys headwards down the slopes of the original uplift and especially where there were weak strata. The Jordan especially was compelled to flow within the fault scarps of the graben and lakes were formed where the graben was deepest and as the waters filled these they overflowed into the next depression. This even course of events, however, was interrupted by the Pluvial period when the whole country was swimming with floods of rain and the Ghor from Lebanon to the divide between the Dead Sea and the Gulf of Akabah was covered with fresh water which emptied viathe Wady el

Arabah into the Red Sea and it is at this time that the thick lacustrine deposits were formed which fill to a depth of 200 feet the graben from the Lake of Tiberias to the Dead Sea. The smooth floor of the Bekaa is due to the alluviation of the same period.

With the subsequent dessication the Ghor became landlocked and the Dead Sea contains the salt water which has not been evaporated. The changes which have taken place here are somewhat parallel to those which have taken place in Lake Bonneville by the change of climate by which the waters have been evaporated until the present Great Salt Lake of Utah is the result.

The Jordan with the dessication of the waters had ample time to cut into these lacustrine deposits though it is nowhere at grade yet. This indicates that the stream is still geologically young.

The graben streams have been mostly influenced by crustal deformation by the valleys of the streams leading into the Mediterranean have been formed more by the active erosive power of the streams which has carved the plateau into hill and valley. This work has been

necessarily handicapped for two reasons, namely, that the rainfall on the plateau is not sufficient to keep the streams at work continually and the nature of the rocks forbids the concentration necessary to a perennial Inasmuch as these rocks are lime they are flow. readily dissolved by the water and to this is due the honey-combing of the plateau by the widening of fissures pipes and caverns extending far below the surface. The limestone being like a hugh sponge which sucks up the water which finds its way to the sea by subterranean caves Sometimes these subterranean streams come to the &с. The frequent failure surface and we thus have springs. of one of these streams has given rise to the myth of the Sabbatical River of Pliny and Josephus according to the former it flows six days in seven and according to the latter it flows only one day in seven.

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These caverns which are due to the solution of the limestone have played an important part both in the occupation of the country by man and in modifying the history of the inhabitants. The Horites the forerunners of the Canaanites were probably cave men. Many of the references to caves in the Old Testament are due to these natural retreats which are capable of defence. Especially the cave of Adullam where David fled from the king of Gath to gather his little army of debtors and malcontents and from which he issued to establish the future glory of Israel. At present these caves furnish shelter to the hundreds of hermits and ascetics in the cliffs from Moab to Galilee.

SCENER**F.** Most of the hills of **F**alestine bear to the plateaus the same relation as that of a finished cameo to the flat surface of a still uncut plate of onyx. These hills have been etched out by the rivers and the erosive power of rain. Thus from every one of these hills you can look down not only into the Ghör but to every other part of the land across valleys of erosion which encircle the hills.

In viewing the mountains of Lebanon or Hermon one will be struck with the great difference between them and that of the Alps or our own Rocky Mountains. There is in the Mountains of Lebanon more of massiveness, simplicity interest to

and strength and less of the grace and serrate irregularity of the Alps and Fockies This is characteristic of the mountain scenery of Palestine which entirely differs from that of any other country and is accounted for by the geological formation. The various strata of the mountain are etched differently in accordance with the varying degrees of hardness of the strata. If the strata be tilted and contorted the harder portions will be left and will stand out in irregular sharp angles of every conceivable shape and form whereas in the case of the Palestine mountains the layers of strata are nearly horizontal the wear will produce horizontal lines on the edges of the beds and vertical lines in the profiles of the retreating cliffs. One process is characteristic of the Alps the other that of the Sacred Mesa or the Colorado canon.

CLIMATE. All the causes of the climate are not known but many of them are directly traceable to the formation of the land. In Palestine there are but two seasons and in the Bible but two are mentioned. There is no real Spring or Autumn the warmth and dryness of summer and the wet and coolness of winter has pretty defined limits. The dry and wet seasons of a tropical

or sub-tropical land. The beginning of the "early"

or "former" rain occurs late in October which is necessar, for the husbandman for plowing and planting in a land which is baked by the heat of summer. Then follows a period of dryer weather and the heavy rains begin again and continue with intermission until March. It is very important that these "latter" rains shall last into April as upon this depends the full ripening of the barley and This illustrates the significance of the promise wheat. "I will give you the rain of your land in due season, the first rain and the latter rain that thou mayest gather in they corn and thy wine and thine oil." The rain in harvest is so rare that it is made the basis of Elijah's miracle, that the Lord sent a thunderstorm in the time of wheat harvest. These seasons are largely explained The summer winds are mostly those by the wind direction. from the north and northwest which cool the land and The afternoon sea breeze account for its salubrity also is a drying wind inasmuch all of these winds passing over the land become heated and absorb moisture. Sometimes also in summer the wind blows from the east or southeast the Scriptural "east" wind typified in Pharoh's dream as "blasting the seven lean ears" and the South wind

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"which bringeth heat" is also a sirocco from the desert incapable of furnishing moisture.

In the winter season however, these south and southeast winds become bracing and stimulating although drying and it is the westerly and north-westerly winds which give out the rain in winter. These are wet from their long journey over the Mediterranean and give up their moisture on contact with the cool surface of the coastal plain and plateau which radiates the heat derived from the winter sun rapidly. This wind passes up from the escarpment and is squeezed and its moisture precipitated and as it passes over the escarpment into the Ghor it is already dry and is expanding and also becoming heated therefore in a condition to take up more moisture and vapor and this keeps the Ghor in the state of a desert. The vegetation of this Ghor is tropical and the average temperature is 6 degrees Cent above that of Jerusalem. This wind passing over the Ghor where it has taken a little more moisture dedeposits this on the eastern Thus the coastal plann, and the western and plateau. eastern plateaus are fairly fertile while the Ghor and is tropical and almost a desert. In these general

relationships the climates of Palestine and California are similar. California with its Coast Range equivalent to the Judean plateau, the great Valley to the Ghôr and the Sierra Nevada to the range of Moab. "To recapitulate the land has two seasons, an early and latter rain, a perennial sea breeze, a tendency to the development of 'northers' and a marked salubrity of climate on the western uplands and a less fertile eastern upland and an intermediate lowland."

PHYSIOGRAPHIC CONTROL. By referring to the series of geological changes already outlined it will be seen that they have had an important part in forning the topography of the country and that the climate is largely the resultant of these geological changes and the topography of the land. In like manner too the habitability of Palestine, the industries of its inhabitants and the varied history of its people, military, political and ethnographic are in large measure governed by the climate and topography of the land. It is these natural conditions of climate and topography determining man's activities in any region which are summed up under the term 'physiographic control' and while little has yet been done in working out the details of these physiographic controls in their application to industries, customs and history of a country yet if they are thoroughly understood it is a great source of illumination to the understanding of a particular people or race.

The great factor determining the habitability of any land is its food supply. The land furnishing the easiest and most abundant good supply is likely to have the larger population and the highest civilization: where the food supply is scanty the whole of man's life is taken up with furnishing the necessaries of life and without the leisure for thought and invention the life of the inhabitants is very primitive. This is probably the reason why the highest civilizations of ancient times have always been found around the deltas of great rivers where the soil furnishes an abundant harvest with little labor allowing time for thought, invention and leisure, sometimes for conquest as in Babylon, Nineveh, Egypt and India. Now the rocks of Palestinebeing composed largely of limestone and sandstone are capable of furnishing good soils and if there be sufficient rainfall are extremely fertile as is seen in the decay of the limestone basement of Virginia. Wherever the rain falls in Palestine there is abundant fertility. The coastal alluvium plain of

Sharon-Philistia is probably the richest as this is watered by streams and has abundant rainfall and moreover the wastefrom the western plateau has been distributed here. The western plateau is the next fertile while the eastern plateau is less so owing to the less abundant fall of rain, and the vegetation ends in the vast desert beyond Moab. The Jordan Valley while alluvial and capable of producing good crops does not do so the only vegetation being where there are springs or immediately on the banks of the river Jordan. Jericho which has abundant springs being about the only place of any size in this whole valley. It seems strange that there should be not be a larger population is this valley as it is capable of irrigation and would furnish abundant fertility as in the case of many of the valleys of the West which have bean irrigated, but the explanation is probably due to the unhealthiness of the climate on account of the lowness of the land the inhabitants of the valley being more feeble than those of the rest of Palestine. The uplands of Jerusalem and other places on the plateaus however are very healthynaturally their fevers being due the the abominable sanitation of the inhabitants.

Next to the food question in importance is that of

the water supply. The water supply of Palestine is somewhat peculiar and much of its history is explicable by the fact of its water supply. Many of the tribal wars and migrations are due to the necessity of good water in the land where it is scanty. The rainfall is not any too abundant in Palestine and is soaked up by the limestone sometimes issuing in perennial springs which have been the source of wealth to families and tribes for generations and many wars have been waged for their possess ion. The whole of the Bible is full of references to the these fountains and brooks and so important have they been that their mention is seen in the finest poetic passages of chronicle or psalm. It was in the cheerless desert of Sinai and the rainless land of Egypt that the people cherished the promise of their leaders that the land that the Lord was leading them to was a land of water and brooks "For the Lord thy God bringeth thee into a good land, a land of brooks, of water, of fountains and depths that spring out of the valleys and hills" and even in Zechariah's triumphant vision of a new restored kingdom he exclaims " it shall be in that day that living

waters shall go out from Jerusalem " Unless we realise the physical conditions of a perennial water supply neither will we appreciate the numerous references in the Old Testament to wells, cisterns, reservoirs or 'pools'. The digging of wells by Absaham at Beersheba was at that time an event of as great national importance as the founding of St.Petersburg by Peter the Great or the raising of the Bastile. These wells were points of military strategical importance as may be seen where the Philistines held them and even David thirsted for the wells of Bethelehem and when Moses sent messengers to the king of Edom for permission to pass through his country it was expressly stipulated the Israelites should not drink from the water of the land.

The rainfall of Palestine not only explains the varying fertility, healthiness and water supply of Palestine but to a large extent the daily occupations of the people. On the Eastern Plateau sheep raising is the staple industry of the prople and Reuben, Gad and Manasseh chose this for their lot. This land is especially adapted for sheep raising as the sheep seems to require very little food and if there be abundance of dew in the

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the sheep will go the whole day without going to drink as may be seen in Scotland any day. This nomadic life allowed time for leisure for introspective thought and reflection on the problems of life as seen in such books as that of Job and probably had a great influence in bringing to its fruition the development of moral and religious truth among the Jews. Moreover such a nomadic life would not furnish opportunity for fixed idols and this allowed opportunity for the monotheistic idea to take root as is exemplified in the case of Abraham where he is commanded to separate himself from the peoples and from his kindred to a land that the Lord should give him. This is all the more significant inasmuch as the monistic monotheistic idea finds its greatest exponents in the Moslem and the Jew both of the nomadic type. Thus the patriarchal idea is the "corner stone of religious history."

When the Hebrews entered the land of Palestine, another change took place owing to physical environment. With the restless roving spirit of the desert under different circumstances they might have become sea vikings or Phoenician sailors and merchantmen but they were kept from the sea by the Philistine with his superior resources or iron and his method of fighting with chariot on the plain, hence they never attained the maritime spirit. They did not utilise the product of the mine of the Ghor and of Lebanon salt, bitumen, iron and coal as there was little necessity for them but on account of the relative fertility of the plateau settled down as farmers around the towns which afforded protection and the proaucts of the simple manufactures of that time. Perhaps too much of the thrift characteristic of the Jew is due to the reluctance of the soil to give him an abundant harvest and the need of careful cultivation and the exercise of prudence. Perhaps the business sagacity of the Jew and the Scotchman may in part be traceable to the land in which they dwell as well as the trait of dosged tenacity so characteristic of both.

With the more settled character of the Israelites they became greatly diversified each tribe becoming distinct in its character and dialect, probably owing to the character of the plateaus which separated each tribe by wadies, fault scarp and desert plain. Tribes almost the same at the time of colonization became differentiated by dialect, jealousies appeared between the agriculturists and the nomads, wivil war also broke out among blood relations and thus Jephthan of Gad fought the Ephraimites from across the graben because they were foreigners and could not pronounce "Shibboleth".

The Ghor prevented easy mixture of common peoples and the Ammorites marched against Moab their relations and conquered them as foreigners; and also had an influence in keeping alive the animosities of the Israelites against the Ammorites, the Moabites and Edomites of the eastern plateau whose customs and manners, religions and languages had greatly differentiated from their own which would almost have been impossible had the land been a plain like Egypt.

Another way in which the importance of the topography of Palestine comes in is in connection with its various wars. Their conquest by foreign powers was due largely not to the lack of valor on their part or to the lack of means of defence but to the lack of central organization and the co-operation of the tribes.

The tribal jealousies being such as to prevent any compact organization and in some cases leading to very near the extermination of a tribe as in the massacre of the Benjamites which almost paralleled that of the massacre of Glencoe. If there had been a central military authority with compact organization with the aid of its natural ramparts Israel would have been able to withstand all aggresion and to this is probably due the brilliant successes of David and the peaceful reign of Soloman and the value of natural ramparts is seen in the the defence of the Maccabees and Josephus against the disciplined armies of the Great Antiochus and the legions of Titus. And the battle of the Three Passes and the tragedy of Massada and numerous others witness to the close dependence of natural defence on the topography of the land. Tabor was the scene of Barak's defence against the Syrians, Josephus used it, Napoleon in 1799 from it drowe the Bedouins into the marshes of Kishon. Even to this day the Druses and Maronites secure in Lebanon have preserved their individuality and religion in the face of the Turk. But though David and Soloman preserved a compact central organization the influence of the topography of the land was too much and for this artificial compact and the tribes broke asunder under Rehoboan

Benjamin remaining with Judah as its natural ally, and the other ten tribes going with Jeroboam, and the subsequent disasters of the children of Israel may in large measure be traced to these tribal animosities and the lack of organisation, which tribal isolation and subsequent clan spirit was due in large measure to the natural barriers of the land.

Again, the topography of Palestine is responsible for the communication of the great world powers of ancient days lending to it a universal interest in the wars and marches of the Egyptian and Assyrian armies. It was situated between the great cities of encient civilization and separated the two great granaries of the world, the Nile Valley and the Tigris-Euphrates Valley. To the west of Palestine lay the Mediterranean, to the east the deserts of Syria and Arabia through which the armies of conquest could only go with extreme difficulty and hardship to the south was the Red Sea which possessed unknown terrors for the ancients. If the annies of these great civilized powers passed between Asia and Africa they must use the natural pathway, fruitful and water-bearing, which the coastal plain and western plateau of Palestine alone Through the passes of Lehanon, down the afforded.

plain of Esdraelon and along the coastal plain marched the armies of Egypt. Babylonia, Assyria, Persia, Greece, Rome and Turkey bent on conquest of the rich plains of Babylon, Nineveh or Egypt or to secure the opening into Persia, India or Europe. Alexander kept this strategie gate open, Napoleon attempted to reach India by the plain of Esdraelon and was defeated at Acre by the English. Bearing these facts in mind it illumines the far sighted statesmanship of Isaiah and the prophets who favored a policy of splendid isolation and counselled their kings to form no alliances with Egypt or Assyria inasmuch as these countries bent on conquest of the rich plains of either country would not delay their march or hazard their resources in the conquest of a country like Palestine with its natural resources for defence unless compelled to do so as being an ally of the opposing power and many of the misfortunes of Jewish history and ultimately the dispersion of the Jews was due to the neglect of this same advice of the inspired prophets.

Palestine has now lost much of its importance owing to the shifting of centres of national power, the discovery of other routes and steamship communication and for these reasons this narrow strip has lost its importance, but twenty centuries ago being the junction of three continents it possessed a commercial importance it is difficult to underestimate for by this route must the surplus products of each continent pass.

No doubt too the splendid isolation of Palestine enables the Children of Israel to maintain their independance for years in the face of strong opposition and the salubrity of the climate and the reluctance of the soil to give abundant harvests without skilful cultivation may account for the thrift and stubborn determinedness his love of country and other characteristics which prevented him from becoming effete as the inhabitants of the more luxurious civilizations of Egypt and Babylonia with their fertile plains and opportunity for leisure and aissipation did.

The foregoing shows but a few of the ways in which the geological structure of Palestine has influenced the history of the Jews both military, political and ethnographic. To trace the influence of the geological structure of Palestine on the development of Jewish history in every detail would be wellnigh impossible as many of them are so subtle as to elude observation. The influence of the topography of a land on the peculiar. temperament of a people for instance is one which is very hard to trace there being so many other things which enter into the making of the character of a race. But although it is impossible to trace the influence of the geological structure of Palestine on the history of the Jews in every detail there are certain important stages in the development of that history where the influence of the topography of the land is clearly seen.

Modern writers divide the evolution of Jewish history into three distinct stages, each of which is connected with a crisis in its history. Mesaism or the period of the giving of the law, which is connected with the Exodus; Prophetism, or the influence of the prophets, which is connected with the rise of the great eastern monarchies, and the third stage of Judaism which is connected with the Babylonish exile.

The Exodus was perhaps the greatest of all these crises. An army of slaves immersed in the idolatry of Egypt were by a signal deliverance taken into a land of which they had had no experience. They were brought into contact with a desolation which was forcibly **Con**trasted with the fertility of the Nile. They were

weaned from the luxuries of Egypt and at times forced to abstinence and thirst, and though they sometimes longed for the flesh-pots of Egypt, the enforced abstinence, the long marches, the rarer air, must have developed an endurance and hardy manhood and their acquaintance with the awful grandear of the land a fearlessness which enabled them to cope with difficulties such as they would never have been able to do when in Egypt. The sanctuary of temples and pyramids awful in their grandear with which they were enclosed, the silence of the rarer mountain air which gave full effect to the evening and moning shout with which the camp rose and pitched and the reverberating thunders must all have contributed to the forming of their character and have impressed upon them the awful majesty of the God they worshipped. Compelled to wander around for food for their herds and cattle they had no time to rear settled idols and had great opportunity for the development of the patriarchal life and the monotheistic idea. Just as Abraham when he left his kindred for the patriarchal life worshipped the one God so the Israelites separated from the luxury and influence of Egypt, learned the lessons of their great Law-Giver amid the awful stillness of the mountains through which the thunders sometimes reverberated and had so impressed upon them the truth of monotheism that it was never eradicated in all their subsequent history. After forty years of this training when a new generation ad taken the place of the old, the Children of Israelmarched to the conquest of Canaan. Joshua using the fords of the Jordan at the city of Jericho, $^{\circ}$ takes this strategic city which gives him the entrance up the eastern pass of Benjamin, Wady Harith into the interior of the country, takes Ai at the head of the ravine, passes over the central ridge into the western pass at Bethhoron and chases the confederacy of the kings of Jerusalem, Hebron, Jarmuth Lachish and Eglon down the valley of Aijalon where they are met by a violent hailstorm which completes the rout. Thus Joshua taking advantage of the natural highways of the country interposes a wedge between the northern and southern inhabitants of the land and completing the rout of the southern confederacy is able to prevent a junction of the tribes of the north and south and to conquor each tribe at leisure which he would have been unable to do had Θ they been united or had not the natural conditions of

of Jericho to march at once into its interior.

The land was then divided among the various tribes and the natural barriers and passes which had enabled Joshua so easily to conquer the country tended now to keep each tribe apart and gave opportunity for the tribal spirit to arise and jealousies to take place between them. Reuben, Gad and Manasseh took the eastern plateau as it afforded good grazing for their cattle and they became so differentiated in time from their countrymen on the west side of the Ghör that their appearance was remarked on.

We now come to the period of the Judges, who were in reality tribal chieftians who had attained eminence in their tribe and the rest referred disputes to them. The Israelites being unable to subdue the Canaanites who dwelt on the maritime plain on account of the chariots of iron they possessed and used to such advantage the Israelites excelling in infantry operations, formed alliances with them and intermarried and adopted many of their customs. Here again the physiography of the land comes in as a determining factor, the Israelites being victorious in the hills and the Canaanites in the plain, thus compelling the Israelites to form alliances with them and adopt many of their customs.

The influence of the tribal spirit brought about by the separation of the tribes by the natural barriers of the land is seen in the massacre of the Benjamites. The want of central organization referred to is seen in the case of Eglon king of Moab who seized the ruined site of Jericho, entered the passes and laid Benjamin under tribute for eighteen years. The Canaanites recovered their strength and swarmed up from the maritime plain through the natural passes or wadies with their chariots of iron, seized the water springs, overran Asher, Napthali and Zebulon and compelled the Israelites to dwell in the walled cities.

This is an example of the topography of Palestine influenting the mode of defence and military tactics. In nearly every other country consisting of highland and lowland the conquerers occupy the plain and the aboriginal inhabitants are driven to the mountain and in the case of semi-barbarous countries so situated the plains are the secure and the hills the insecure parts. The reverse is the case in Palestine, here the mountains are the secure and the plains the insecure parts, the

conquerors occupying the mountains and the conquered Canaanites the plain, probably to the fact of their having chariots. This state of affairs is largelydue to the topography of the land, the mountains being due to fault scarp and erosion on horizontal strata afford a portion capable of easy defence, as in the case of the Sacred Mesa of the Western States, whereas the mountains in most other countries are jagged due to the erosion of tilted strata and affording scarcely any space for building a fortification on the top. Moreover Palestine is an island in a desert waste and from this very fact an island in the midst of pirates, the Bedouin tribes of the desert penetrating up the plains or dry river courses which run into the interior of the land and up the Valley of Esdraelon to reap the harvests. A notable case of this is when the Midianites encamped in the maritime plain and pitched their tents in Esdraelon and lay along the valley like grasshoppers for multitude. These were dispersed by the strategem of Gideon who with his little army composed of the members of the tribes of Asher, Zebulon, Napthali and Manasseh rushing down upon them during the night from Mount Gilboa and drove them in confusion to the ford of Bethabarah under the hills of Ephraim who captured two of their kings and gave evidence of tribal petulancy that they had het been asked sooner to join in the battle.

Later the Ammonites entered the land and conquered Judah, Benjamin and Ephraim and the oppression became so fierce that the Israelites put away their false gods and declared that they would serve Jehovah if He would deliver them. Jepthah of Gilead led them and completely routed them but the Ephraimites in a fit of tribal jealousy commenced a tribal war and so keen was the animosity that when being worsted they sought the fords of the Jordan, they were put to death because they could not pronounce aright the tribal Shibboleth.

The Philistines now oppressed Dan in the South and Samson was raised up to deliver them and Samuel aided by a thunderstorm completes the work at Ebenezar.

This completes the period now called Momaism. The influence of the topography of Palestine is clearly seen in reviewing the course of any of these invasions. Nearly all the invasions come up the natural passes formed by the valleys of the streams and the Israelites are

forced for refuge into their fenced sities. These natural ramparts of defence explain how it was that the Israelites in these early stages, were able to maintain an existence against overwhelming forces which must have been sufficient to utterly decimate the separate tribes. The natural barriers also explain the growing tribal jealousies and the want of co-operation save when actually compelled to do so by fear of utter extermination and explains to a certain extent the successes The frequent mention of natural of the invaders. phenomena in turning the tide of battle in many of the Israelitic wars must also be attributed to the topography Furthermore in reading the history it of the land. appears that almost all their misfortunes followed on a relapse into idolatry. Now while it is true that these calamities may be a judgment on their falling away from the true worship yet as nearly all God's judgments come through natural causes it seems probable that owing to the barriers of communication between the tribes and the natural ramparts, with the rise of the tribal spirit
each tribe would seek its own tribal god which it would adopt probably from the neighboring nations or invent one of its own. Jehovah ever remaining the great national deity. When they fell into calimitous times they would revert to the worship of Jehovah which worship was the bond of union between the different tribes and thus they would by co-operation and the rousing of a national spirit be able to repel the invader from their land. After the invader had been driven out the national compact would cease and they would again revert to their tribal deities with the consequent weakness consequent upon such a course and would be again subject to oppression by the ever ready desert pirates by which they were surrounded. Moreover it appears when the nation was greatest under the reigns of Saul, David and Soloman that the great bond of union was the worship of Jehovah and when they fell away from this after the revolt of the tribes and different altars were set up at Dan and Bethel by Jerohoam the nation commenced again to fall away from its former glory. This may not be the true explanation of these frequent reference to idolatry being accompanied by national peril but it appears to be a very possible one.

The second period of Jewish history commenced with the death of Samuel, the appointment of the first king, and the rise of the schools of the prophets and later the great eastern monarchies. This is the period when Israel begins to emerge from obscurity and become a great power It is the Golden Age of Israel when a literature was produced which has been the delight and inspiration and strength of hundreds of millions and has influenced mankind as no other literature has done. It is the period of its kings, its authors, its statesmen its warriors, its poets and its prophets. At no time did Israel reach so high a degree of civilization or exercise so great an influence in the affairs of the world military, political and religious as that embraced within the period of the prophets.

In many ways Palestine is eminently fitted to be the cradle of such a race as that of the Jews, to mould its manners and customs and peculiar racial characteristics and direct its future destiny and to influence the language and thought of its people and to give to their works a universal character and world wide influence.

Palestine though in the midst of the great ancient civilizations is secluded and set apart from the world.

The cities of the Euphrates and Tigris on the east were alike the rulers and corrupters of the world, but between these great empires was the barrier of the desert and the nomadic tribes and the still greater barrier of the Ghor, on the south were the Egyptians but between Palestine and Egypt lay the great and terrible wilderness the platform of the Tin which rolled like a sea between the valley of the Nile and the valley of the Jordan. This wilderness itself could only be reached on the eastern side by the tremendous pass of the Akabah on the southern and of Safed at the northern end of the Arabah, or the no less formidable ascents from the shores of the Dead Sea . The two accessible sides were the west and the north, on the west entered "anaan by the Sea, but the sea when Israel was not yet a thorofare but rather a terror and boundary of the nations, and moreover the coast unlike Greece has no indentations or creeks or good havens such as was necessary in ancient times even more than now for the protection of commercial enterprise, the whole coast line containing but three bad harbors that of Joffa, Acre and Caipha, on the north the ranges of Lebanon formed a good

rampart but the gate between them was open through which the hosts of Syria and Assyria poured.

Furthermore, Palestine had a central etc situation it was in the midst of the nations. It stood midway between the great empires of Babylon and Egypt. It was the high-way from one to other of these great powers. The prize for which they contended, the battlefield on which they fought, the high approach from which trey ascended and descended into the deep basins of the The first great war of Abraham Nile and Euphrates. was against the host of Chedorlaomer from Persia and Babylon and the last battle in which the hero of the Jewish monarchy perished was to check the advance of the king of Egypt on his way to conquer the king of Assyria at Carchemish and the whole history of Palestine between the return from the captivity and the Christian era is a contest between the kings of the north and the kings of the south the descendants of the Seleucus and Ptolemy for the possession of the country. Then later Palestine becomes the scene of the chief conflicts of Rome and Asia (4) As Stanley admirably put it "There is no other country in the world that could exhibit the same confluence of

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associations as that which is awakened by the rocks which overhang the crystal stream of the Dog River where it rushes through the ravines of Lebanon into the Mediterannean Sea where side by side are to be seen the hieroglyphics of the Great Rameses, the cuneform characters of Sennacherib and the Latin inscriptions of Antoninus" Moreover Palestine by its comparative fertility, its streams and brooks must always have rendered it the prize of the Eastern world especially of the Bedouin tribes whose life was in the desert. The Israelities dwelt in a land which was evidently the gift of God and not of labor as in Egypt and all this within sight of the desert was calculated to raise their thoughts towards the Supreme Giver of all. Moreover besides this there was the hailstorm and the continuous peal and roll of the thunder reverberating among the hills, the violent hurricanes and the clouds of thick darkness almost touching the ground, the earthquake and the volcanic phenomena all of which must have tended to increase their fear and wonder and exalt the majesty of their God. The earthquake and volcanic phenomena find abundant

(mention)

mention in the Bible. The earthquake in the reign of Uzziah from which Amos dates his bock. "He looketh on the earth and it trembleth He toucheth the mogintains and they smoke" "The mountains quake at Him and the hills melt and the earth is burned at His presence." and many otners attest these phenomena. Possibly the convulsion at the crucifixion where the vail of the temple was rent in twain from the bottom to the top may have been caused by one of these earthquakes. Moreover there is a variety of structure and climate exhibited in the Holy Land as nowhere else. Such a country as this would naturally furnish the theatre for a literature and history which would find points of contact in nations the most diverse. If the sacred history had occurred in any other country while the truths of life might have been the same they would never have been clothed with such a variety of form as would have appealed to all nations. No other country was fitted to give a more cosmopolitan aspect to truth. Here we have the life of the Bedouin tribe, an agricultural people, of sea-faring cities, the extremes of barbarism and civilizations. the aspects of mmountain and plain, of tropical eastern

northern climates. A variety of life could be had here as nowhere else. Here were the shepherds, the warriors the trafficers. Their language and poetry embrace features of almost every country and finds a charm for every nation.

Reverting to the history of this second period. The various tribes sinking their differences under the influence of Samuel and the prophets assembled at Mizpah where they chose and crowned their first king Saul and a code of national laws were established and the proceeding solemnised by sacrifices to Jehovah. Then followed a period of war with varying success in which Saul attempted to rid the country from the grasp of his foesand these contested as stubbornly their conquests. The Philistins were put to rout at Michmash near the old site of Ai where Joshua had defeated the confederacy of the kings of the South the Philistines being filled with terror at an earthquake which shook the ground. Saul assumed the initiative and waged successful wars against Moab Ammon, Edom and the Amalekites. Saul is then seized with madness and Samuel anoints David of Bethelehem as the future king. Saul became jealous of David and he was forced to flee. He gathers his army of malcontents and debtors around him in the cave of Adullam

and was able to preserve his life against the King and eventually when Saul is killed at the battle of Mt. Gilboa he becomes king of Judah with his capital at Hebron with Ishbosheth Saul's son for a rival. After many skirmishes of both kings, at Gibeon trial by combat of twelve 'picked men from either side was agreed upon but all being killed the armies engaged and Ishbosheth was defeated and a series of petty wars ensued in which David's army grew stronger. Ishbosheth is murdered by his body-guard and his head carried to David who punishes his murderers and gives the head of Ishbosheth decent sepulchre. David is now chosen king by all the tribes and the impregnable fortress of Jebus which had never been taken though the lower city had once been was by a stratagem taken and made the capital. David now having a secure stronghold ten years later pushed his conquests far and wide subduing the Philistines and establishing garrisonsin Edom, making himself master of the eastern arm of the Red Sea and the caravan routes of Arabia, vanguished Hadadezer king of Zobah and put the Moabites under tribute destroying their capital Ar or Rabbath and later defeated the Ammonites at Rabbah with

their allies the Syrians. Soloman now becomes king and concludes treaties with different powers and makes preparation for the building of the temple. He makes alliance with Hiram of Tyre and thus the traffic of the Mediterranean was opened to him having possession of Elath and Ebion-Geber on the eastern shore of the Red Sea he constructed another fleet to sail to Ophir and he also exchanged the products of his own country for those of Egypt and Israel became in his reign a world wide power. The reigns of David and Soloman showed that the Israelites when they were united with their natural fortifications and their splendid isolation, were able to repel all invaders.

Rehoboam not realishing that the tribes were held together by a feeble bond acted with a great deal of harshness and the kingdom separated Judah and Benjamin remaining faithful to the house of David and the other tribes following after Jepeboam who set up idels.

The subsequent history of the Jews is marked by disorganization, loss of the national spirit, disastrous alliances which led them into useless wars and general ruin, culminating in the captivity first of the northern tribes by Sargon who captured Samaria and removed the Israelites to various parts of his dominions and peopled their places with colonies from Cuthah, Hamath and Sepharvain. The kingdom of Judah held out for nearly a hundred years longer but was eventually captured by Nebuchadnezzar who placed Mattaniah who took the name of Zedekiah in charge of the exhausted kingdom. Disregarding however the warnings of the prophet Jeremiah he made an alliance with Apries of Egypt and this offered the pretext for another invasion and Jerusalem was captured and razed and the inhabitants of Judah removed to Babylon.

This briefly outlines the important phases of the second period and shows how the topography of the country both helped and hindered the children of Israel. The land was capable of natural fortifications so strong that when the people were united in one compact organisation they could resist all enemies but while the land afforded natural defence these very barriers to invasion influence. the people and kept alive the tribal spirit which prevented any active co-operation. The wars and conflicts of the tribes during this period is the resultant of the operation of these two forces, the tribal and the national spirit.

The third great period is that following the Babylonish exile and lasting to the beginning of the Christian era. The people were removed from the land but the memory of its hill and valley, sea and mountain was so vivid that it has given us some of their most pathetic poetry. Under the seal of Cyrus a decree was issued permitting the Jews to return but the glory of their land had departed. The non-occupation of the land had allowed the terraces to fall out of repair, the rain beating down on the slopes unprotected by the olive and the grape had washed the earth into the valleys loaving the rock bare and sterile, the aqueducts for irrigation had been destroyed and the people were too poor and discouraged to repair them the vegetation had been devastated by fire and the whole land was a wilderness which had once been a garden of vine and olive. Nehemiah and Ezra with patriotic zeal endeavored to restore the country to somewhat of its ancient splendour but their efforts were thwarted by their neighbors in Samaria, Sandballat and Tobias. The former national spirit and the high ethical ideals had departed giving place to a cold legalism and formality. Palestine

being the highway between Syria and Egypt became the prize of the Ptolemies and Sedeucids and eventually passed into the Roman power. The obstinate and restless spirit of the Jew which had been formed and developed by his long residence in the mountainous country of Palestine, and his tribal wars, still continued and he was restless under any foreign power and could ill bear the yoke of peoples whom he considered both in their history and religion to be far inferior to himself. While his restless spirit incited him to revolt his tribal spirit would never permit him to submit to central authority and the subsequent history of the seige of Titus, the fall of Jerusalem and the further calamities which befell the Jews are in large measure explained by the position of the Holy Land, its peculiar topography, and the various physiographic controls which have moulded the peculiar character of this remarkable people.

From what has been said it will bee seen that the physiography of the land touches the history of the Jews at every point, conditioning and modyfying the course of events in very material ways and sometimes as a watershed diverts the rain falling on it into rivers whose mouths are thousands of miles apart, so too the incluence of a peculiar topography in conditioning a victory or defeat has changed the whole course of the nation's history.

It will be difficult to underestimate the influence of the topography on the national character of the Jews in the early stages of their history. Leaving the fertile rainless plains of Egypt they wandered amid the grandeur of the Sinaitic mountains with their awfulness and solitude they were weaned from the idol worship of Egypt, living a simple, frugal, thrifty life they developed a sturdy, strong, agile, independent manhood and the grandeur, the awfulness, the silence of the desert impressed on them as nothing else could the great teachings of their law giver Moses. Enclosed within these mountains which were too rugged to afford dwellings and compelled them to live in the plains, and having been compelled to fight the wandering tribes of the desert for their springs and oases would developed

a bond of unity among them which enabled them to subdue the scattered tribes of Canaan to better effect.

After they entered the Holy Land they still retained many of the desert customs and the patriarchal mode of life, but gradually became an agricultural people. The salubrious climate, the hilliness of the country, the necessity for manual labor in cultivation, the height of the land above the sea and the consequent rareness of the atmosphere all tended to develop a strong, agile, independent, intellectual people: the variety of climate occupation and scenery gave to them a rich and picturesque language, and the variety of occupation tended to produce a higher vivilization as it afforded them more time for reflection and thought and thus better fitted them for their universal destiny. Their separation from the other great powers of the world also enabled them to develope more fully their peculiar religious ideas. The hills and the valleys tended to separate them and gave to each tribe its own peculiar customs. The hilliness of the country prevented them from developing trained armies of cavalry and they became a nation of infantry: and were unable to dispossess the Philistines who were possessed of chariots, and the Philistines were

unable to drive them from their mountain fastnesses. The flat or rounded tops of their hills which had been etched out from the plateau enabled them to build cities and fortresses which were wellnigh impregnable and explains the expression "I will lift up mine eyes unto the hills from whence cometh mine my help" The natural barriers allowed the tribal spirit to develop and led to many civil wars and they found it difficult to repel invaders owing to their lack of co-operation.

Being separated from the luxuriousness of the Babylonians and the Egyptians and having to work fairly hard to maintain life, and also being helped by the coolness and the bracing winds of their winter climate, they did not become effect and decay as these other civilizations had done but maintained a national existence long after the cities of the Euphrates and Tigris were in ruins. With the advent of their greater kings David and Soloman who welded the separate triber into one compact nation, their empire became worldwide in its influence and so strong were the natural defences of the land that so long as they co-operated they were well-nigh invinci-With the advent of Rehoboam the tribes again ble. became separated and gradually fell a prey to their

Assyrians and later the Jews, not recognising the farsighted statesmanship of the prophets who advised an policy of neutrality, they became subject to Babylon. Even in their captivity the beauty of their land appealed to them, the dreary monotony of the plains of Babylon being unable to obliterate from their memory the beauty of the hills of Palestine, and their patriotism never died

After the restoration, Palestine being the highway of commerce between Asia and Africa became the prize of contention between the descendants of Ptolemy and Seleucus. The wars of the Maccabees gained for the Jews a short independance which owing to the lack of agreement among themselves was soon lost and the Romans became their masters.

At this time was born the Christ, the heir of avariety of life, civilization, history, language, poetry and religion such as no other nation possessed, a language which fitted the truths He conveyed for universal adaptation. How much the Gospel owes to the natural surroundings of Nazareth in imagery, poetry, truth, parable and exalted thought it is difficult to estimate but if we could trace the many influences of the physiography of the land in detail, no doubt it would be found that much of the pleasure and universality of the truth therein contained is owning to the form in which it is cast and the peculiar though subtle influences of the character of the land and climate on the mind of the Great Teacher.

I have dealt with but a few ways in which the physiography and geology of a land modify and control the life of the people within its borders and mould its history. The physiography of the land is the mould in which the history is cast. By a detailed study of the land one could see the strategy of the battles, the causes of the successes and defeats of the panics and the victories but to enumerate in detail the influences of the physiography on the life of the people would require more space than is permitted within the compass of a thesis, and I have therefore contented myself with pointing out the general lines of influence that have modified the life and history of the Jews.

To conclude let me sum up in the words of Mr. Reginald A.Daly in his paper on "Palestine as Illustratin Geological and Geographical Controls."

"The chief object of the foregoing sketch shall "have been met, if the reader recognises that the geo-"graphical facts concerning Palestine form a single great

"system, that the relief, drainage, climate and resources of that land are all, directly or indirectly, the effects "of the geological history, and together, the causal "conditions of human life, industry and history within the "borders of southern Syria; and that the old Eccene sea-"bottom possessed potentialities which had, so to speak, "as their logical consequences, the development of a "Levant, the existence of a Jordan River, the rise of "that maryelous Jewish race, the brilliance of a long-" continued Phoenician vivilization, the Crusading romance "a Napoleonic campaign and the massacres of the Christian "Maronites of a later day. In particular, I would emphase "size how excellently well Palestine illustrates the "influence of barriers on animal and plant life and "on the human inhabitants. Orographic barriers are "represented in grabens, fault-blocks, fault-scarps, and merosion scarps; climactic barriers in the wide wastes of desert land in Syria, Arabia and Sinai. We have noted "that it was impossible for men to occupy the separate "basins, valleys and plateaux without becoming character-"ized by tribal peculiarities, and hence that a uniformity

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"of population as among the Indians of the Mississippi
"Valley or of the plains of Paraguay, or among the govern"ments of Great Russia, is here neither expected in
"theory nor discovered in fact.

"The climate has conditioned the nomadic life, and with it the peculiar strength of family life and of the "principle of obedience; and has undoubtedly had an "important influence in moulding the moral and religious "ideas of the Hebrew people. It is, of course, not " intended to minimise the difficulty of allowing for the "innate, and, as yet, unexplained springs of conduct "which are the inheritance of the races of Palestine "before they entered the country. Free volition and a "particularly enterprising nature must have played a alarge part in the formation of Phoenician commerce, since "the smooth-flowing outline of the Levantine coast-line "is, in truth, more a discouragement than an incentive " to navigation. Yet we have seen that, even in this case "there is some good physiographic explanation of the "phenomenon."

"Finally, a preliminary review of Palestine physio-"graphy from this genetic point of view may be commended "to the student of the Old and New Testaments; to natrative "and literature it lends a vividness and concreteness "which cannot fail to stimulate both the memory and the "appreciative faculty."

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