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حیومورفولوجیہ الانکال الارضیہ



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أ.د. محمد صیری محسوب

جيو مورفولوجية الأشكال الأرضية

طبقا لقوانين الملكية الفكرية

جميع حقوق النشر و التوزيع الالكتروني
لهذا المصنف محفوظة لكتب عربية. يحظر
نقل أو إعادة نسخ أو إعادة بيع أى جزء من
هذا المصنف و بثه الكترونيا (عبر الانترنت أو
للمكتبات الالكترونية أو الأقراص المدمجة أو أى
وسيلة أخرى) دون الحصول على إذن كتابي من
كتب عربية. حقوق الطبع الورقى محفوظة
للمؤلف أو ناشره طبقا للتعاقدات السارية.

٤	تقديم
	الفصل الأول
٧	صخور قشرة الأرض
	الفصل الثاني
١٩	الأشكال الأرضية التكتونية والتركيبية
	الفصل الثالث
٤٩	التجوية والأشكال والأرضية المرتبطة بها
	الفصل الرابع
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	الفصل التاسع
٢٩٦	التعرية الجليدية
٣١٢	المراجع

Dynamic Equilibrium

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W .M.

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Davis



الفصل الأول

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Rosen Busch

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-
-

SiO_2 ()

Strata

Cementing Materials

:Igneous Rocks :

:
:

Intrusive Rocks

Non Volatiles

Volatiles

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SIO₂

FeO

% -

AL₂O₃

% -

% -

MgO

% -

()

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:Acidic Rocks :

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%

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)

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:Alkaline Rocks :

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Gabbro

Plutonic

% -

Ultra basic

() % - %

.Serpentine

()

% -

:Sedimentary Rocks :

:

(1)

:

Unconsolidated

:

%

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.Mud Stone

:Cementation -

Voids

:Crystallization -

:

:

-

Boulders

:

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		()
Conglomerate or Breccia	-	Boulder Cobble
	-	Pebble
	-	Granule
Sandstone	- /	Sand
Clay stone or Shale	/ - /	Silt
	/	

()

:

:Rudaceous Rocks :

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(2)

Angular

Breccias

(3)

:(4) Arenaceous Rocks :

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-

—

Sand Stone

(2)

(3)

%

(4)

:Argillaceous Rocks :

-

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-

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(5)

Fire Clay

%

(5)

(6)

.Loam

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-

Organically Formed Rocks :

(7)

.() ()

Lime Stone

.Mussels

Eolithic

Limestone

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(8)

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%

(6)

(7)

Belemnites

(8)

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Evaporates

+

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Stalactites

Stalagmites

Chart

Dolomite

Colloidal Solutions

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Nodules

:Metamorphic Rocks :

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Earth Movements

:

: -

:Recrystallization : -

.Thermal Effect

:

:() -

.()

Hydro

Thermal Solutions

:() -

Dynamic Metamorphism:

Slate

:

:Slate : -

:

-

Contact Metamorphism

%

:Schist : -

:

-

:Marble : -

الفصل الثاني

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:

:

Liquid

State

.Pumice

()

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-

Water Vapour

Mud Flow

Lava Platforms

Gradational Forces

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:Volcanic Cones :

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Lava Fragments

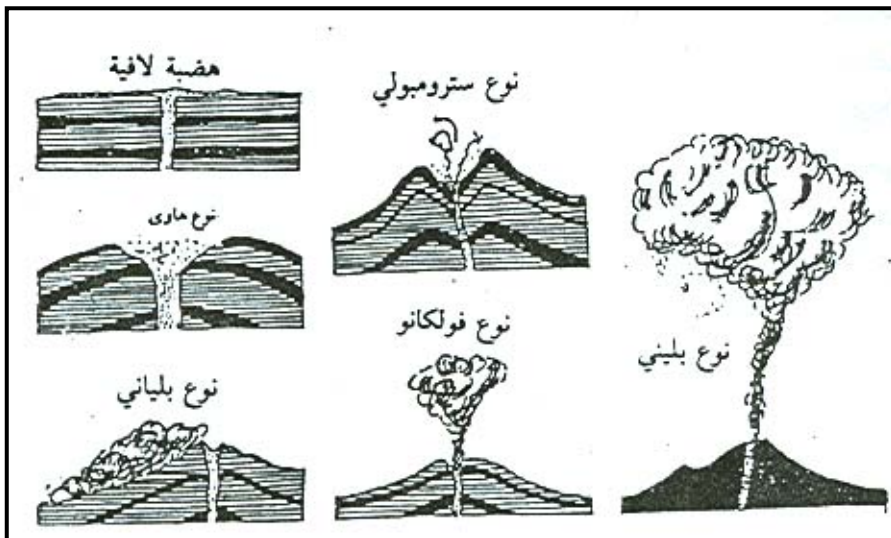
Alkaline

(9)

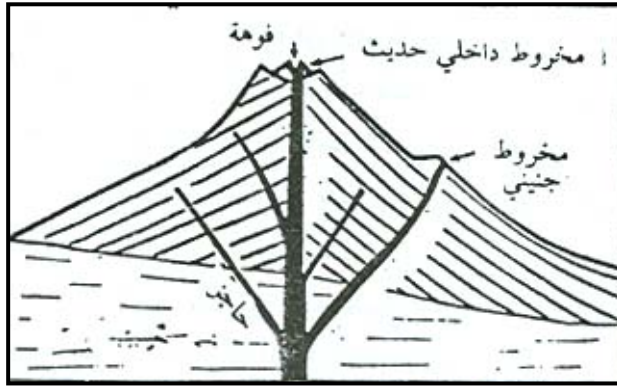
Maunaloa

Acidic Viscous Lava

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Fissures

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) Cone Lets

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Etna Volcano

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Cascade

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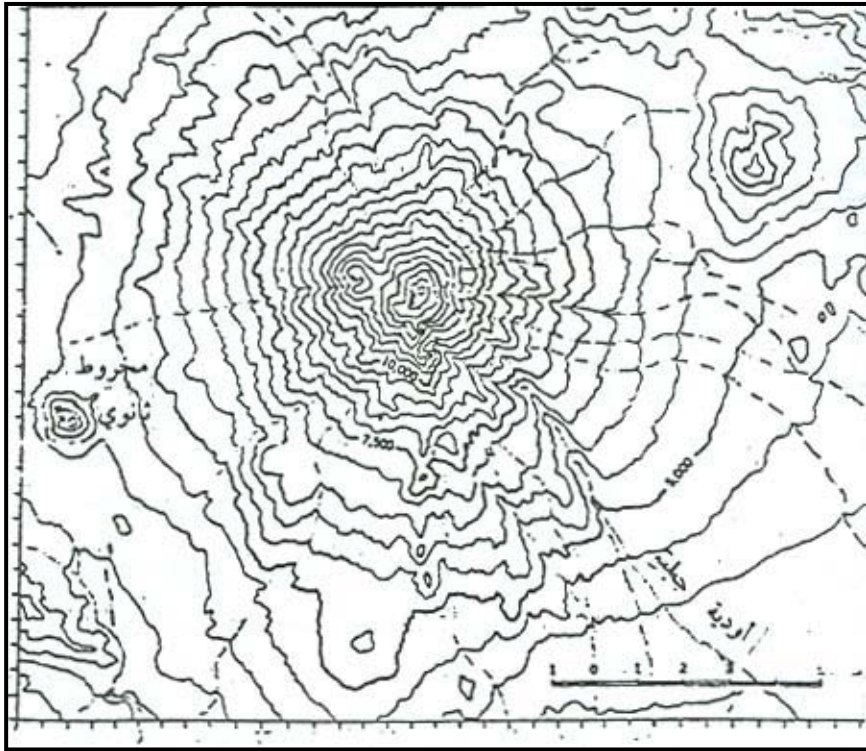
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Radial Pattern

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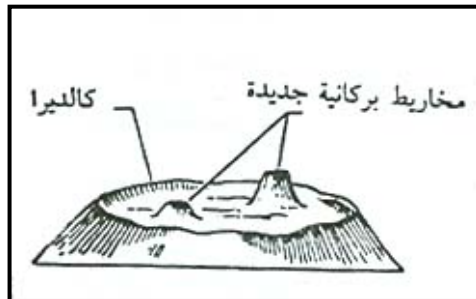
Glaciers



() ()

:Caldera : -

Huge Crater



() ()

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.Explosions

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-
-

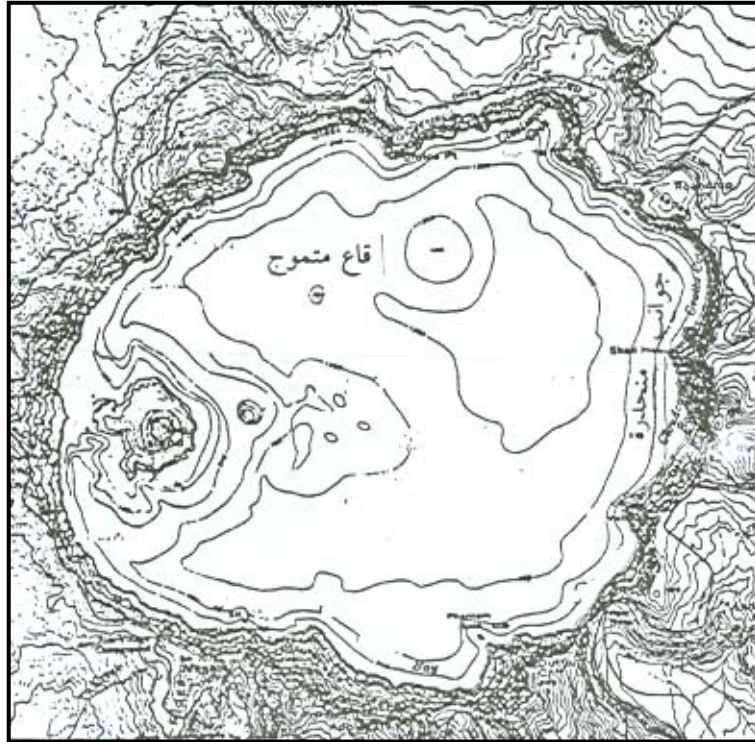
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Wezard Island

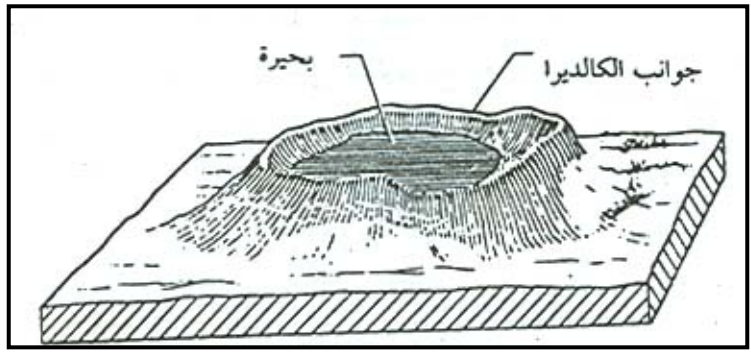
Kerr – Valley

Cirque

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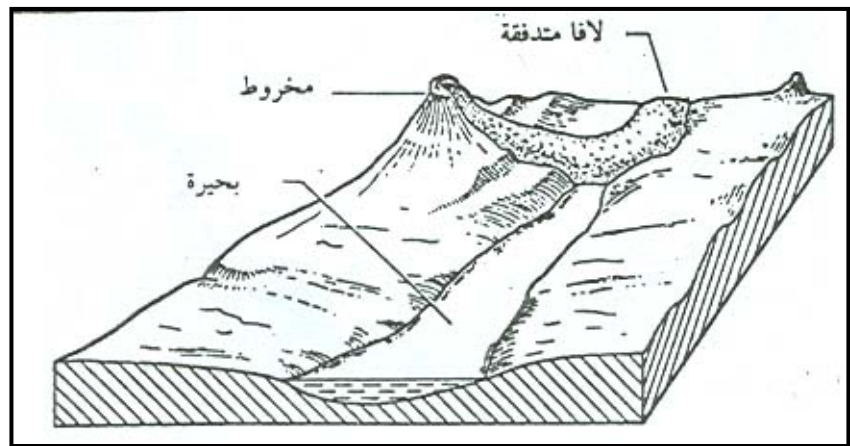
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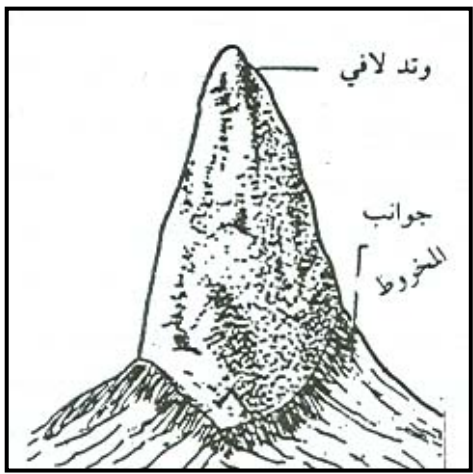
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: Volcanic Neck : -

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Java wedge

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Lava Plateaus

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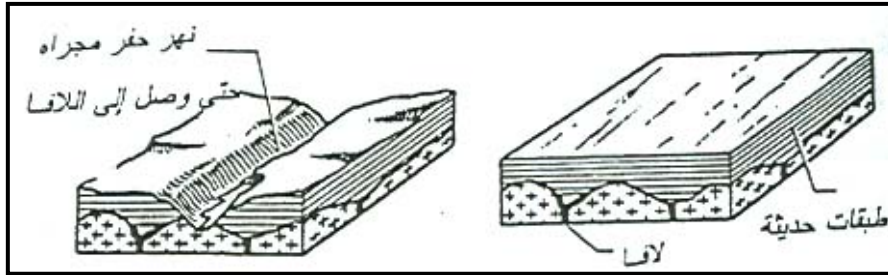
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Superimposed River

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(10) Batholiths



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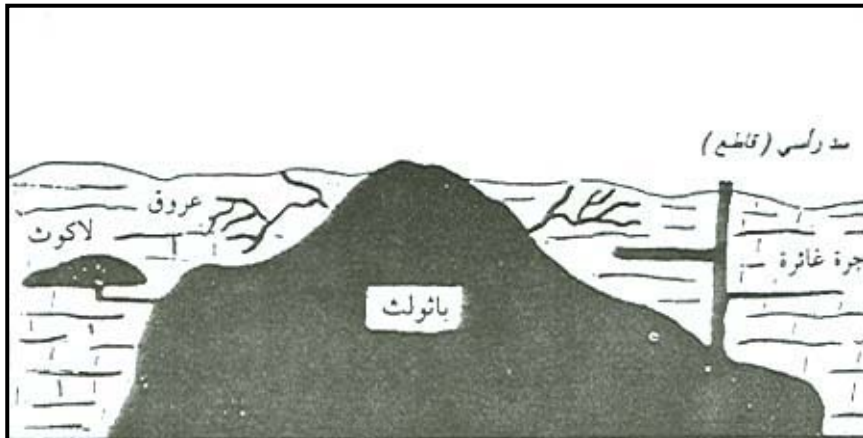
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Coarse Grained

Massive Texture



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Sills

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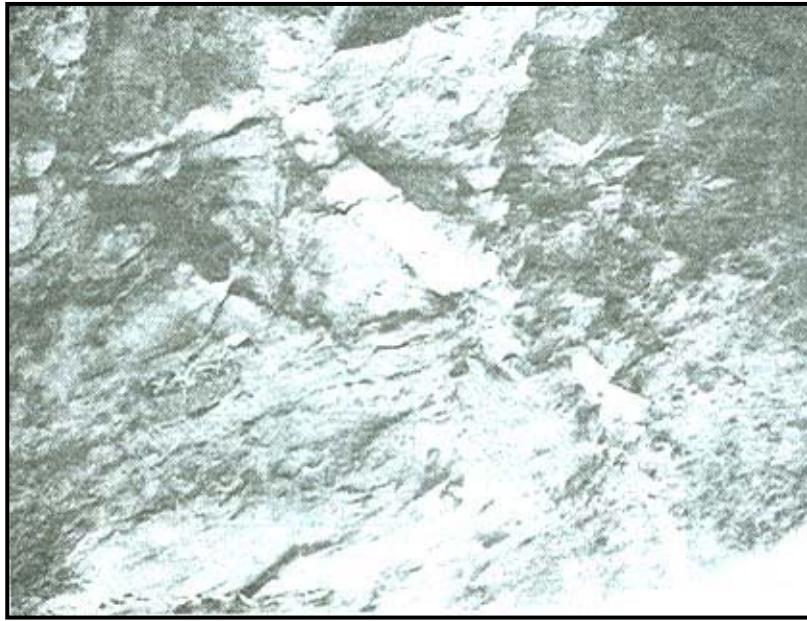
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:Dykes :

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(11)



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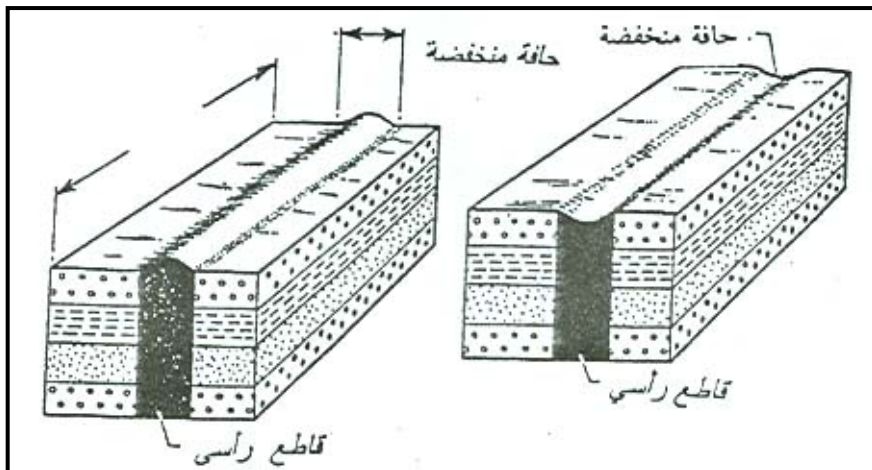
:Laccoliths : -

Domal

Ridge

Shallow – Depressions ()

()



() - ()

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Vertical Forces

Tension

Compression

Surface of Fracture

Fault Plane

Displacement

Fault – Creep

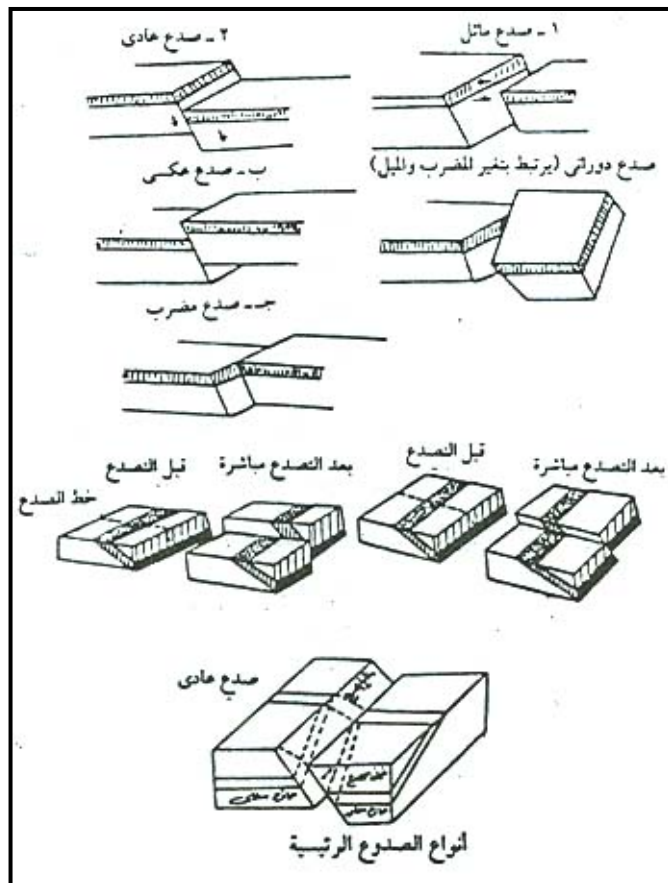
:()

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:Normal Fault :

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:Reverse or Thrust Fault :

Compression

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:Step Faults

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:Horsts

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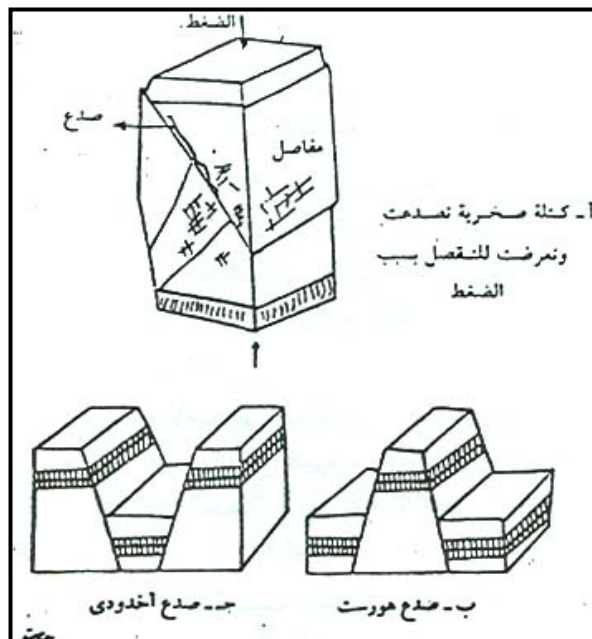
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(12)



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:Tectonic Breccia :

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Screws

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:Shearing Zone :

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Faulting

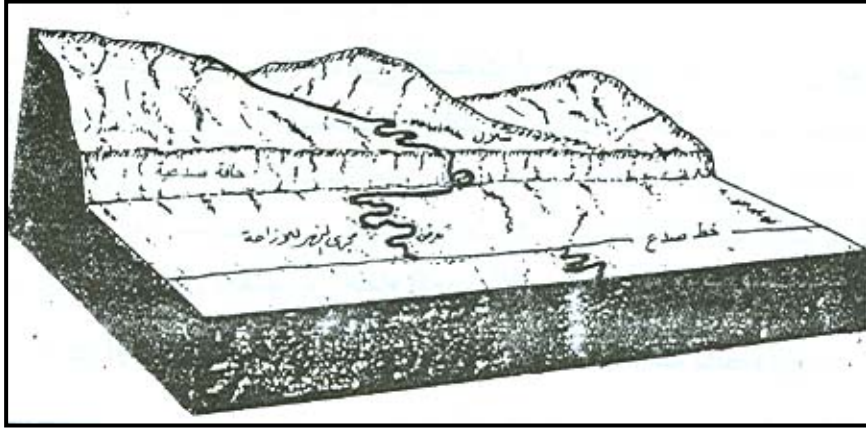
A Fault Scarp

Very-Steep - Slope

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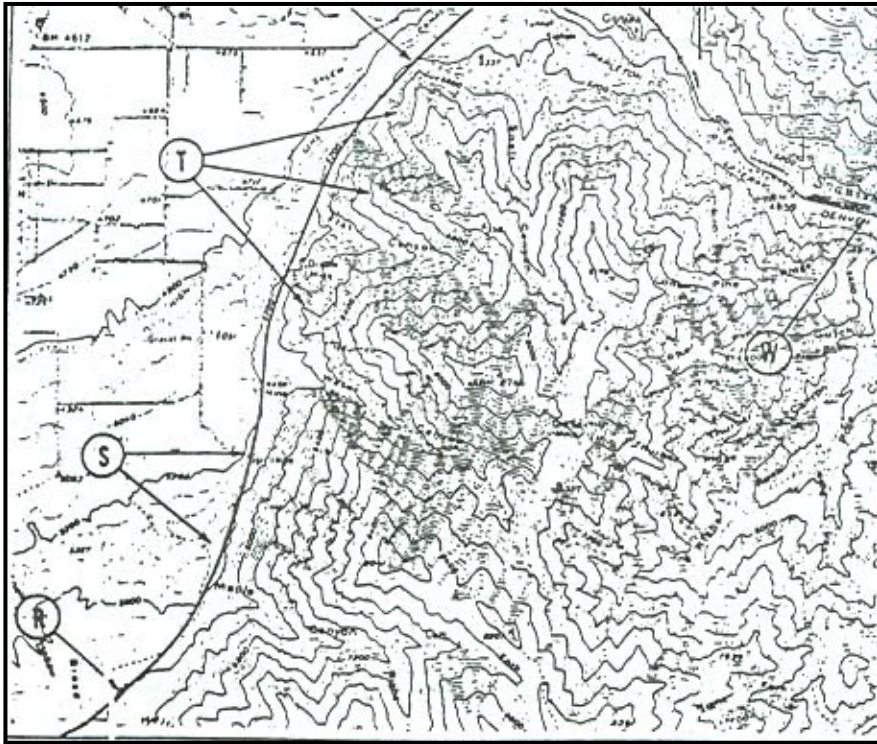


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Wasatch

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(W)

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.Bonneville Lake

" "

Canyons

Sea - Basins

(13)

" "

Rectangular – Shaped Blocks

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Lateral

Compressions

(14)

:(Fold) (

:

()

.Strike – Line

: -

Block Faulted

(13)

Ripples

(14)

Folded ()

: -

: -

: -

:limbs : -

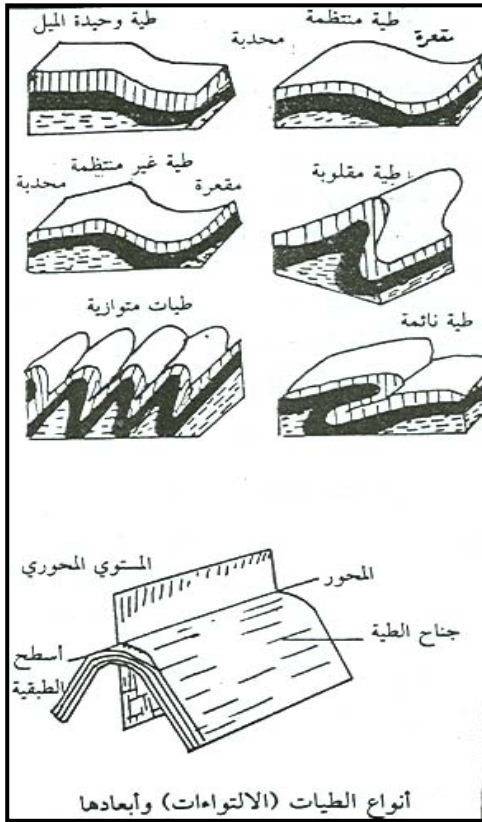
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Elastic Limit

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:Monoclines : -

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:Up Folds : -

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:Down Folds : -

. - -

Overtured

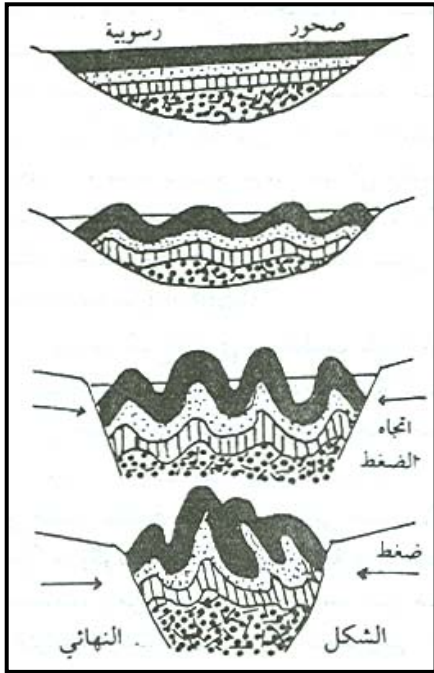
Recumbent ()

.Over Thrust

Domal Fold

()

Salt Dome



Holmes A

Geosynclines

A and Hudson Robinson)

Jura

:Domes and Basins :

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.(77 p

Oval Shaped

Folding

" "

Domal

Structures

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Anticlinal Valleys

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Escarpments

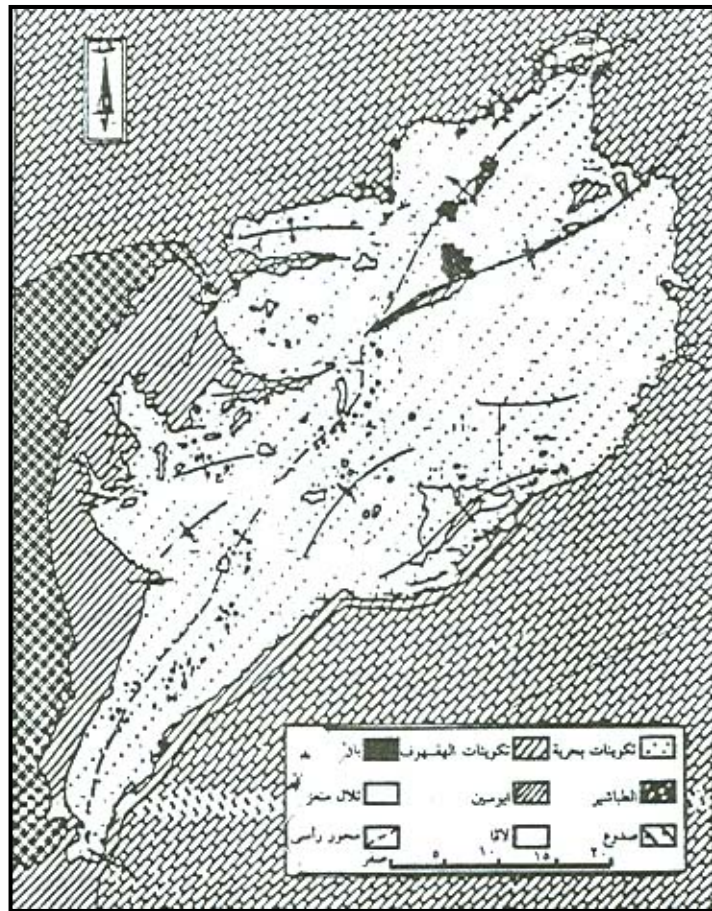
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Greenville

Radial Drainage Pattern

Hogbacks

Annular Pattern

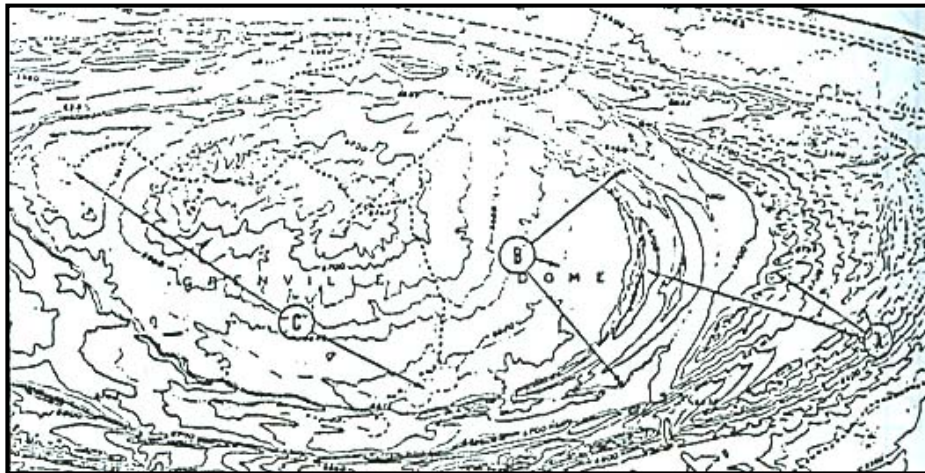


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A



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B -

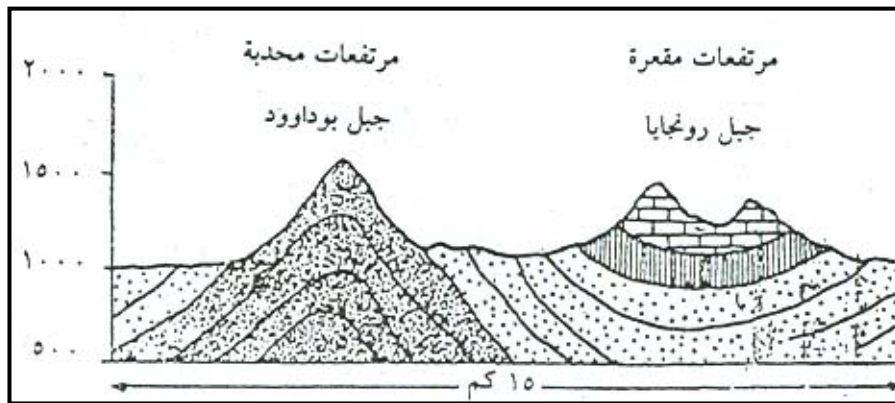
C -

Central – Depressions

.Playa Lakes

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Breached Anticline

-

Consequent V

Gently Folded

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Monument Valley

Organ Anticline "

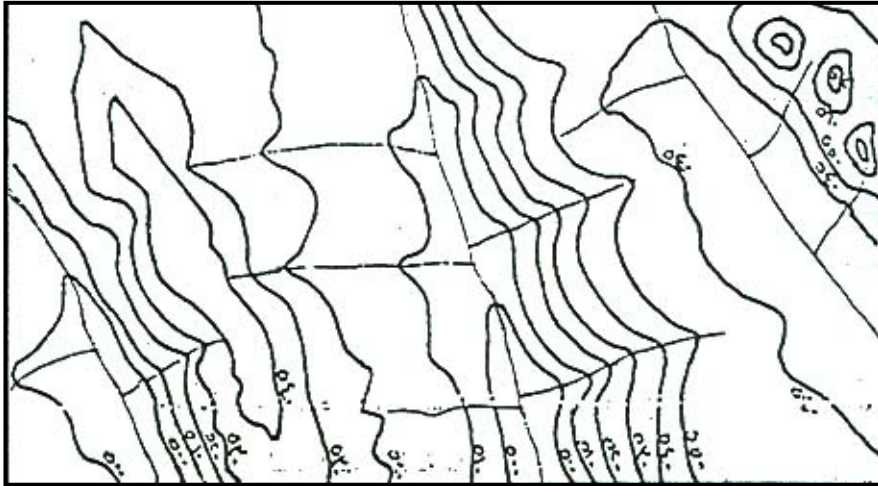
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Oljeto

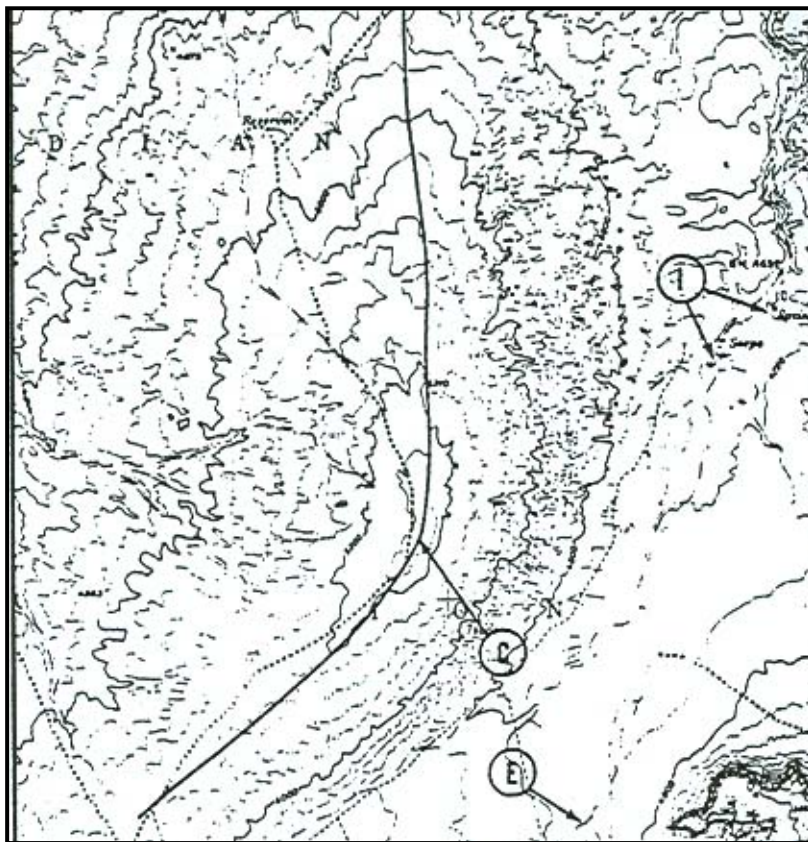
E

C

Syncline



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Horizontal Strata

Friable rocks

Cliffs

Benches

Cliff and Slope Topography

Morisawa)

()

Isolated Hills

(M

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-

Primary Structures

(¹⁶)



()

:Lamination : -

:False Bedding : -

Cross Bedding

()

() - -

:Joints :

-

Bedding Plane

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-

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-

Shearing

Cracks

-

(17)

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(17)

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()

()



()

الفصل الثالث

.Exfoliation

:

Exogenesis

End Genetic

()

Texture

Feldspar

Fine Grained

Coarse Grained

Bedding Planes

Joints

Micro Fissures

-

-

Free Faces

A R.U. and Warren Cooke)

(P30 1973

and M Clark)

(p. 15. J Small

Humid

Temperate – Areas

Tropical Areas

.(1974 M. F Thomas)

)

(

–

–

(P 15 J and Small M Clark)

Deep Regoliths

Extreme Continental Climate

:

:

Physical Weathering:

: ()

:Pressure Release :

(

Overlying –

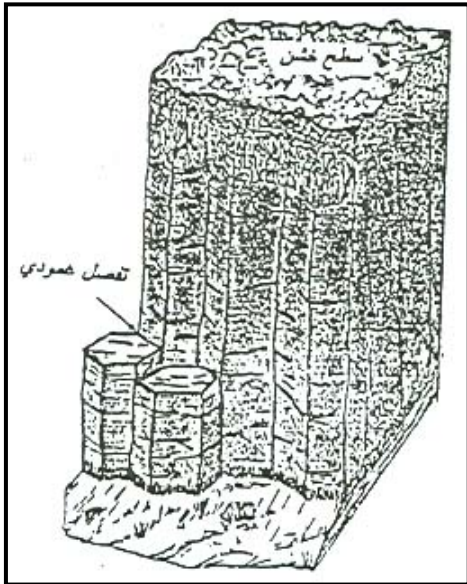
Deposits

Elastic Expansion

Confined

Intrusive

"Sheet Joints"



()

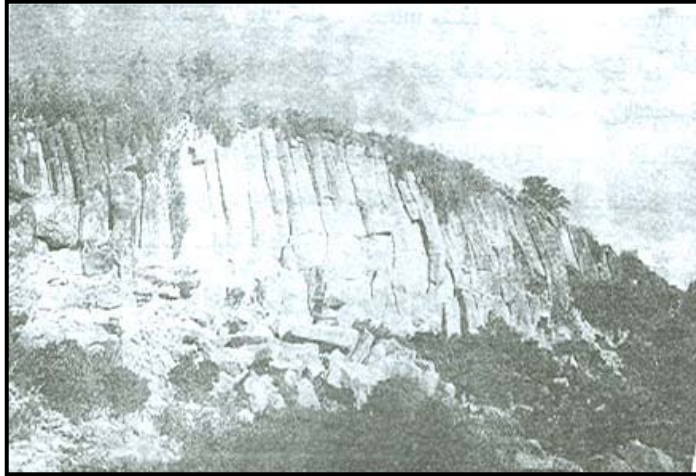
Vertical Joints

Cub dial Jointing

()

Isenberg

()



()

Joint Spacing

Micro Fissures

Exfoliation

:() Frost – Action

(

(18)

Snow Precipitation

–

Ice Wedges

%

Frost

Rigid Rocks

Cycles

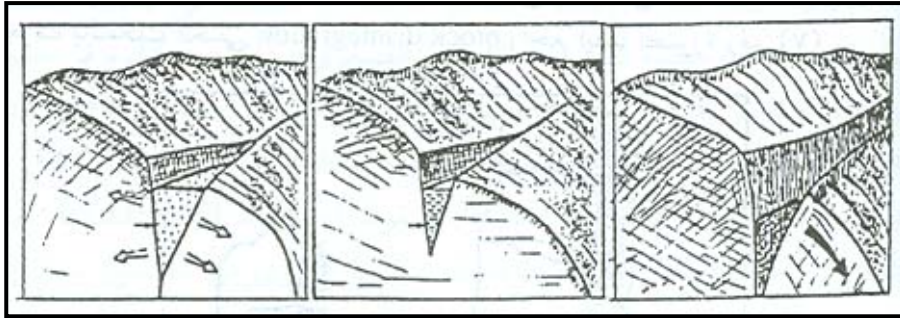
Cooke and Warren

(18)

Mojave

()

(19)



()

Screens

.Outcrops

()

Abrasion

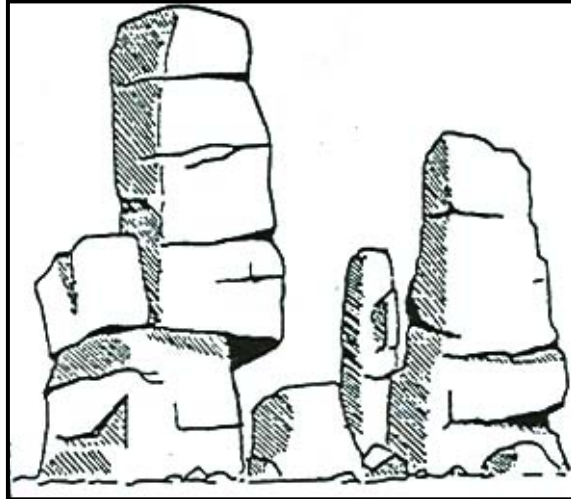
()

. Angular Screens

()

.()

Block Disintegration



()



()

(1960 Rapp)

Lap Plan Karkevagge

Boulders Fall

Pebbles Fall

(P. 19 J M and Small Clark)

and Honey Borne Harris

-

:Salt Weathering : (

E and Pass Blank)

(1923 rage

Supersaturated

Expanse Stresses

Granular Disintegration ()

Weathering Pits

Semi – Arid – Areas

Swells

.(P 186 1973 A. F Pitty)

Subsoil

Cooke and)

(Warren

Crevices

Diurnal Range

Na

KC

Na Cl
(20)

NO3

Capillarity

Relative Humidity

Physiochemical Weathering

M and Small Clark)

Tafoni

.(P21 Q

:Salt Weathering Cycle :

Salt

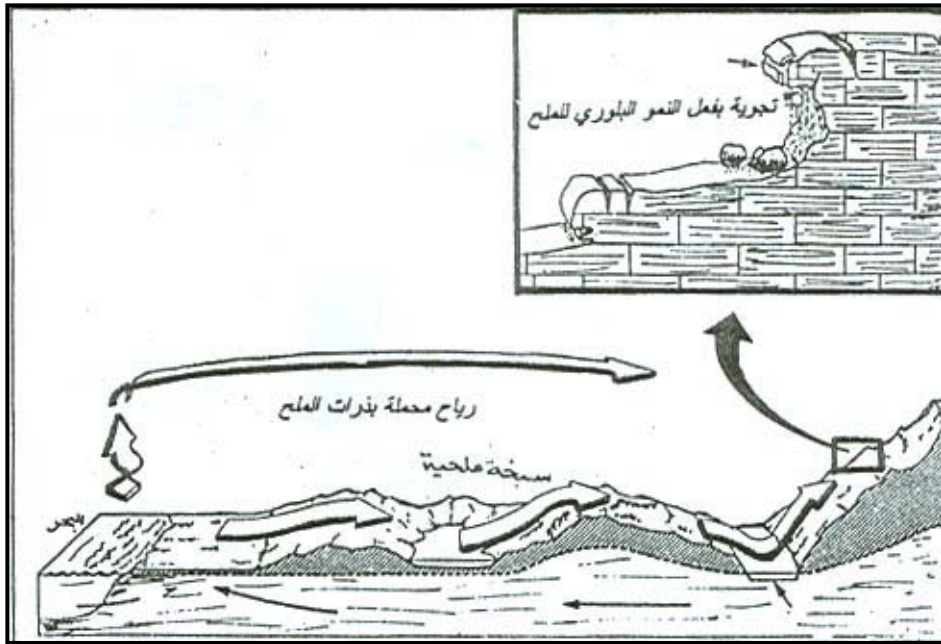
Ash

% ,

Ca SO4

(20)

()
Salt Crusts



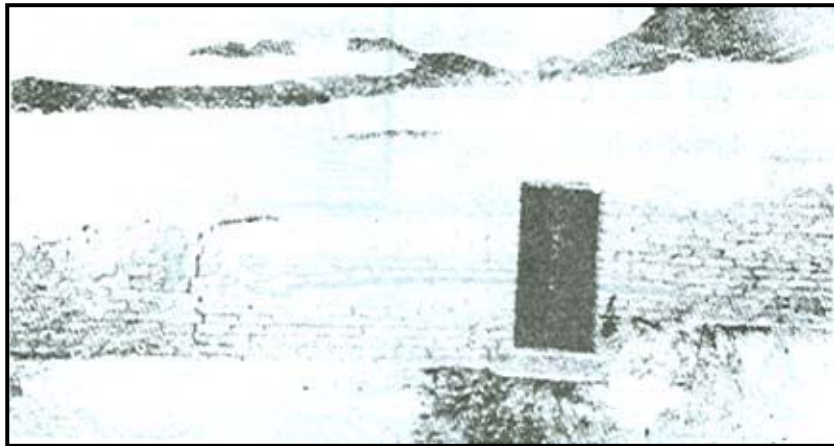
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Insulation Weathering:

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(21)

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Temperature Variations

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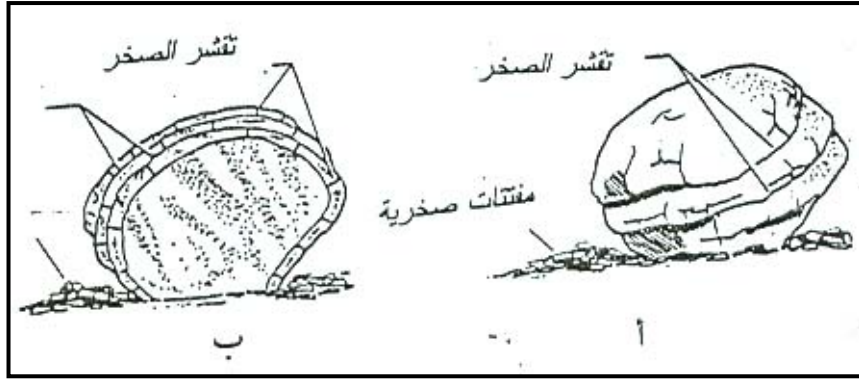
(



()

Exfoliation

(21)



()

Permeability

T and Cooke)

(P291 1974 Doornkamp. J

:Chemical Weathering :

Reactions

Chemical

Composition

Desegregation

-

-

Clusters of Crystals

Under Ground Water

Water Layer Weathering

Wetting

Drying

" "

Pitting

Semidiurnal Tide

Diurnal Tide

.()

:

:Solution (

.....

()

Concretions " "

Chert

Acidity

Al₂ O₃

(PH >)

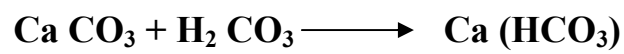
Neutral

(Ph)

:Carbonation (

Ca CO₃ to Ca (HCO₃)

.H₂CO₃



Hodgkin 1984

Emery

()

Photosynthesis

low tide

(Wave Spray)

.()

:Hydration (

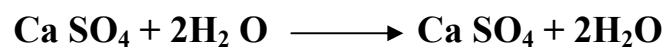
Physical Stresses

) Calcium Sulphate

:

()

(Anhydrite



Iron

Hydroxide

:Hydrolysis (

(22)

Aluminosilic Acid

Kaolinite ()
()

kaolinitation

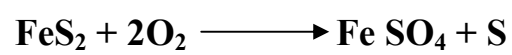
:Oxidation (

- % -

Bauxite

Latirite

()



(22)

:Biotic Weathering (

Chelation

Complexes

Soil Leaching

Ions

()

Allison

Lichens

Lithophytes

Mosses

()

()

Inorganic

Earth's Worm

Matters

Drawin



()

Termites

Termitaria

()

Blue Green Algae

(1980 J Davies)

Debrat

()

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Weathering Notches

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Flat Surfaces

Notch

-

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Undercutting

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()

:

.Solutions Channels

-

-

.Centripetal Channeling

-

.Grikes

Clints

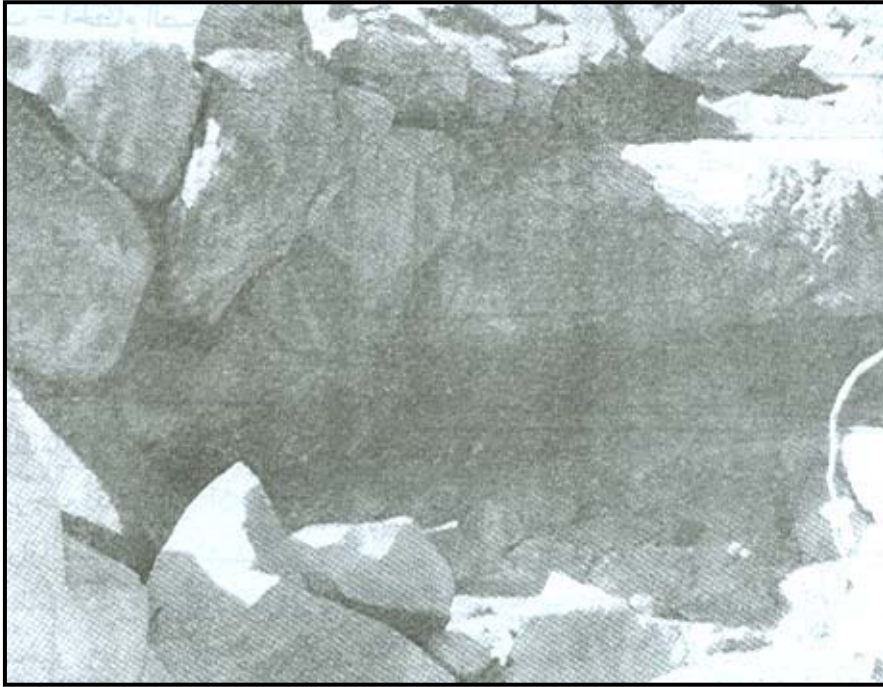
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.Karren

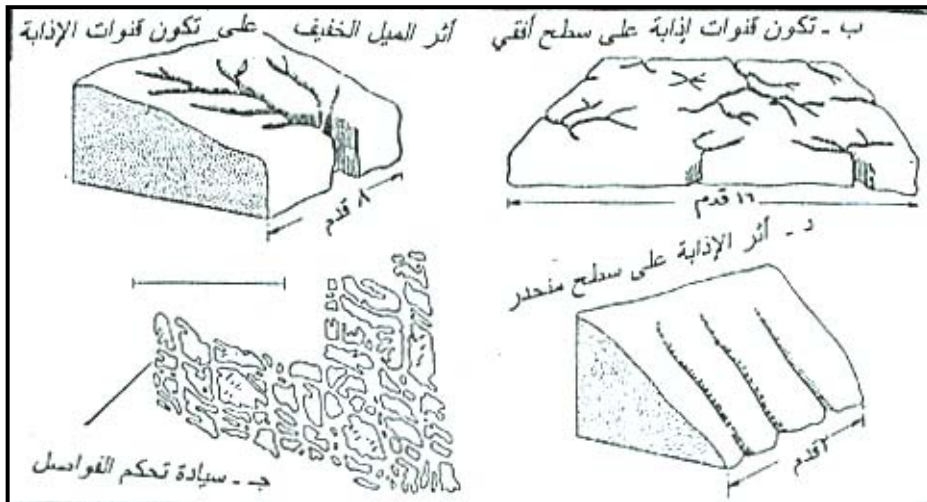


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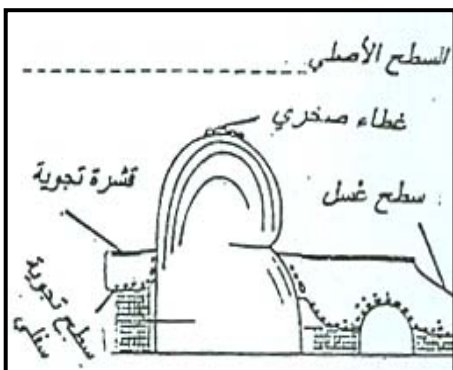
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:Regolith

(

()

()

Deep Regolith

A Pitty)

(1972

.()

(1961 Buxton and Berry)

Leaching

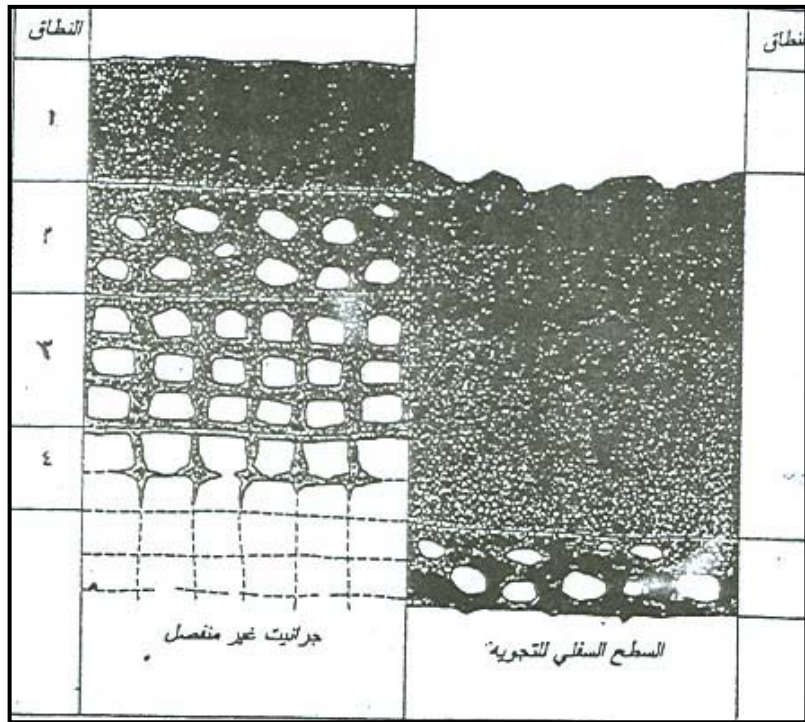
()

- -

.Bedrock ()

Berry Ruxton

: ()



()

:() -

Residual Debris

Unweathered

:() -

%

:() -

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()

.()

:Boulder Fields (

⁽²⁴⁾(Concretions " ")

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الفصل الرابع

-

Natural Slopes

Man Made Slope

Mass Wasting

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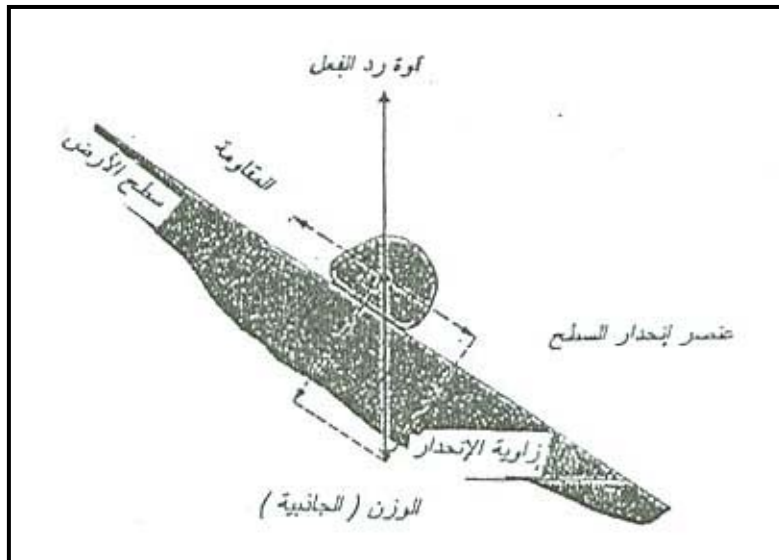
() Resistance

()

Gravitation

Upward -

() Reaction Force



()

X

()

()

(Reaction Force)

Instability

()

Periodical

Water Pressure

Drying

Wetting

Saturation

:

:Friction -

Roughness

Sliding Friction

Rolling Friction

:Cohesion -

(25)

(25)

:

:

Slope Washing

(

Gullies

()

Erodibility

Infiltration Capacity

.Subsurface – Flow

–

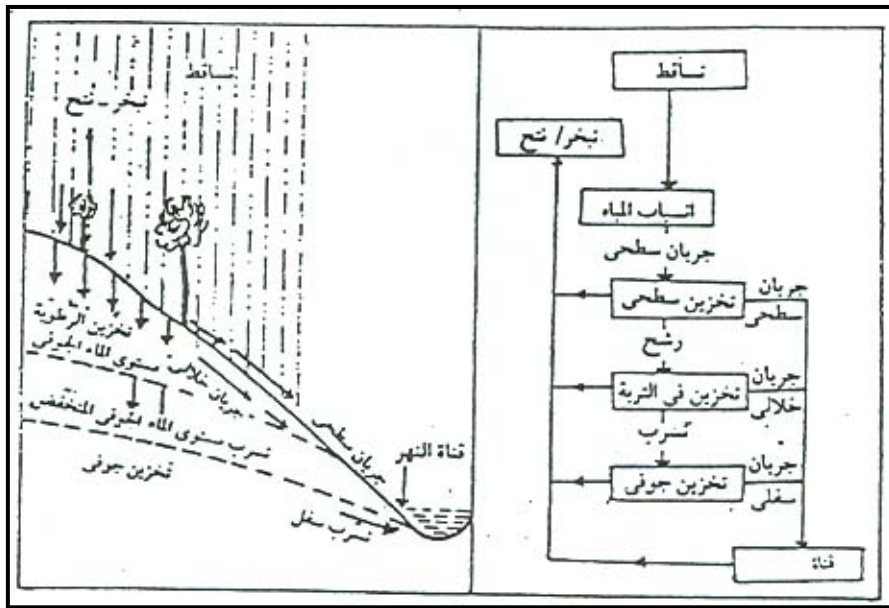
Saturated Overland Flow

Impermeable Layer

Underground Water

.()

Interflow ()



()

Surface Flow

Rain Fall –

(

:Impact

)

()

:Mass wasting

-

Mass Wasting

(Finlayson and Statham 1980)

:

Transport Limited Slopes ⁽²⁷⁾

:

Rapid Mass Movement

:

Unsorted Debris

Slope

Processes

:Rock Fall

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(27)

Buoyancy

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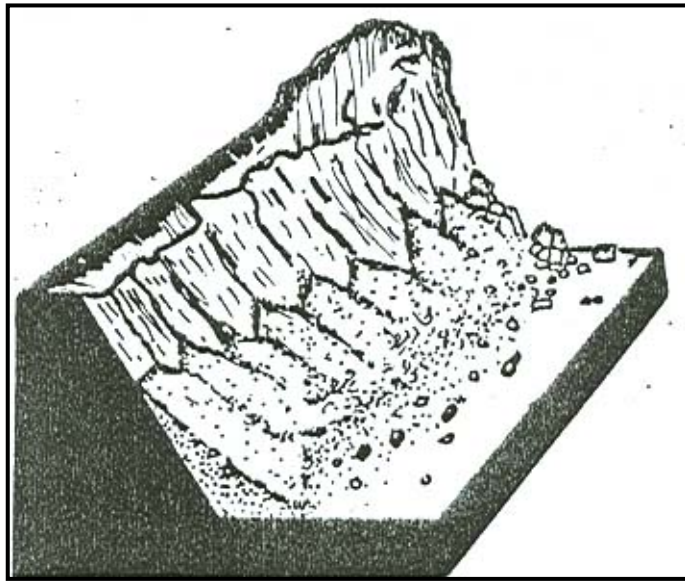
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(29)



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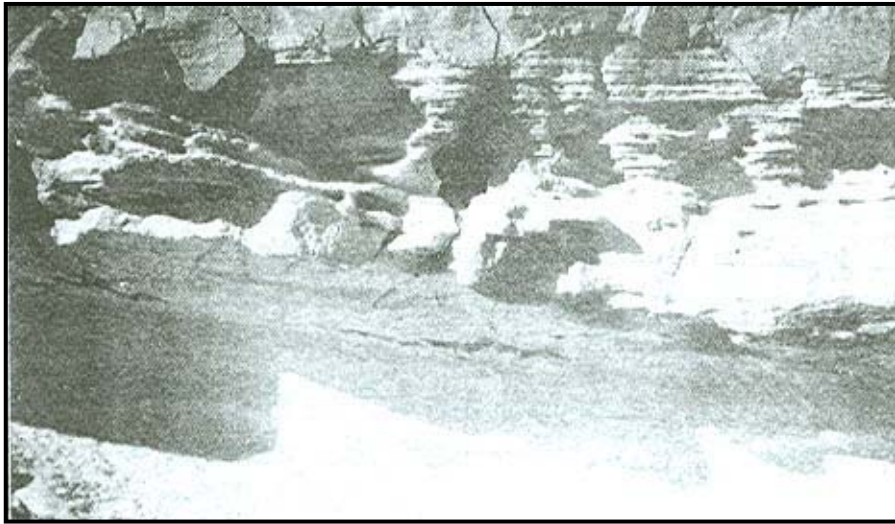
(28)

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(29)

Pressure Release

Jointing



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Free Faces

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Angel of Repose

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⁽³⁰⁾ :Landslide

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Sliding Planes

Bonds

Rock Debris

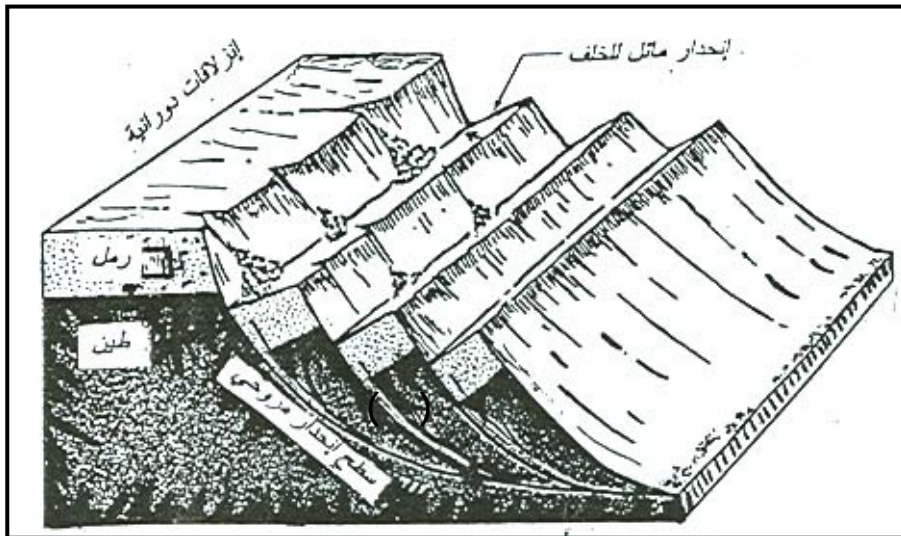
.Arcuate Slide Planes ()

:Rotational Slip

Tilted

Back

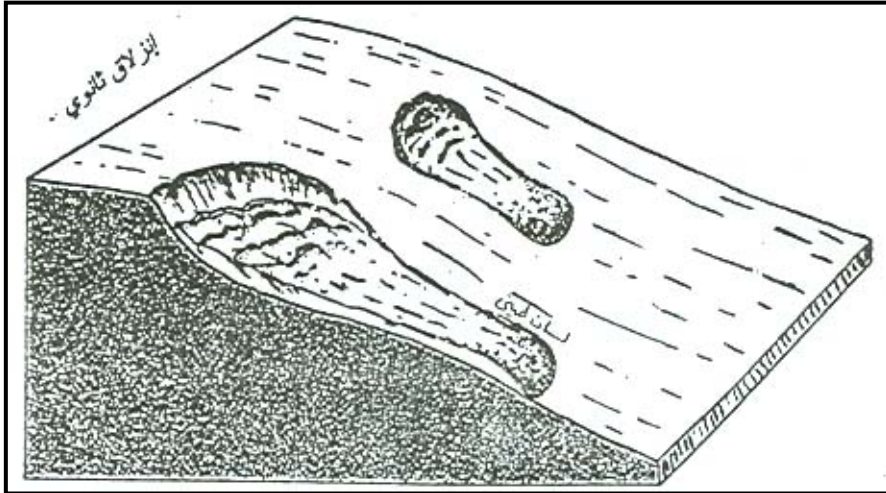
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:Slump -

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:Debris Flow -

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:Rock Creeping -

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.Gravitational Stresses

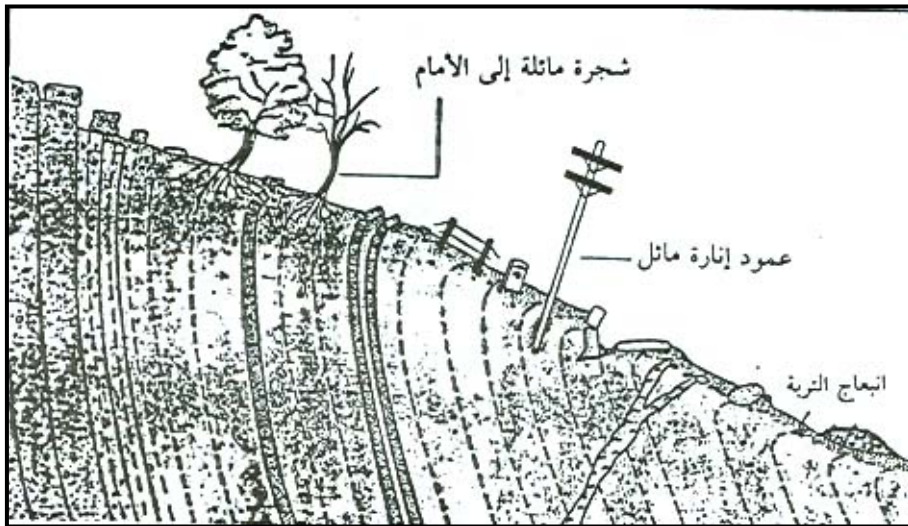
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:Talus Creep ()

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Scree

Cone



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:Solifluction ()

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Soil Materials

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Subsoil

. () Over Saturation



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Active – Lubrication

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:Earth Flow

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Concavities

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:Mud Flow

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Shear Waves

() Compaction

Lateral Spreading

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Volcanic Mud Flow

(31)

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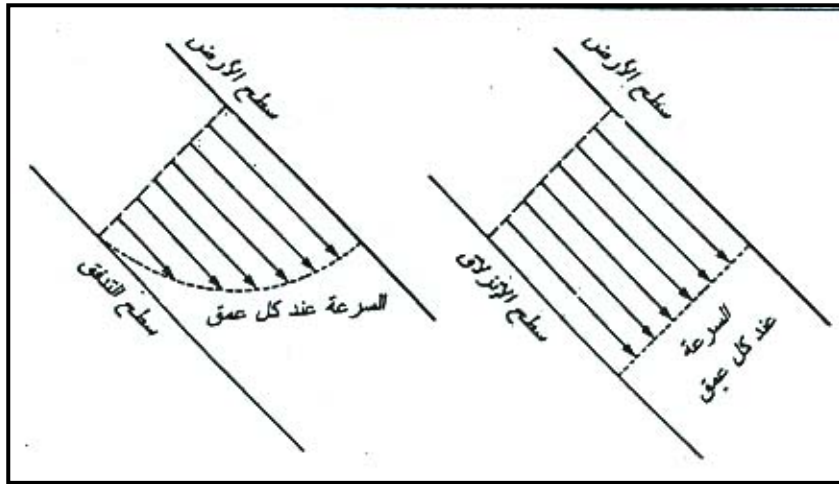
:Velocity -

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Soil Creep

(31)



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Saint Jean

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Valley

(P 43 Y and Small N Clark)

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Frequency of Occurrence

Duration

Ander

Karkevagge

1960 Rapp

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Rapp ()

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Clarck and Small

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Solifluction

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Earth Flow

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Slope

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Wood

Young

Penck

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Strait

Concave

Convex

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:Convex Slopes

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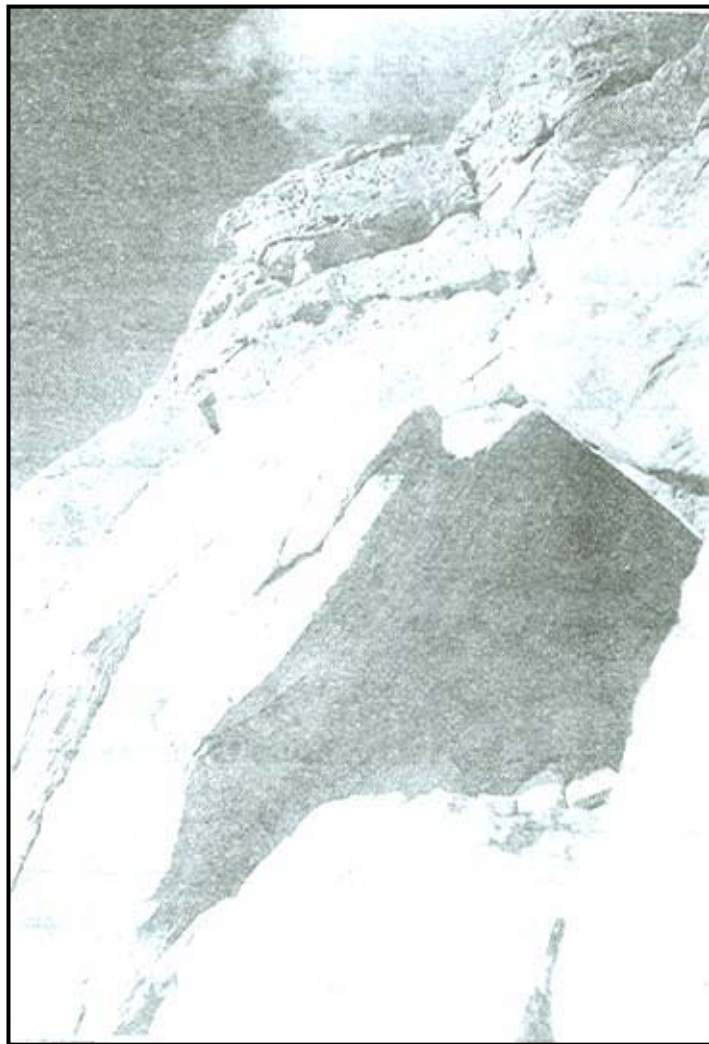
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:Concave Slopes -

:Strait Slopes -

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:Gentle Slope ()

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:Steep

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:Wood's Model (

(33)

Wood

High Initial Slope

Under Cutting

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Talus Slope -

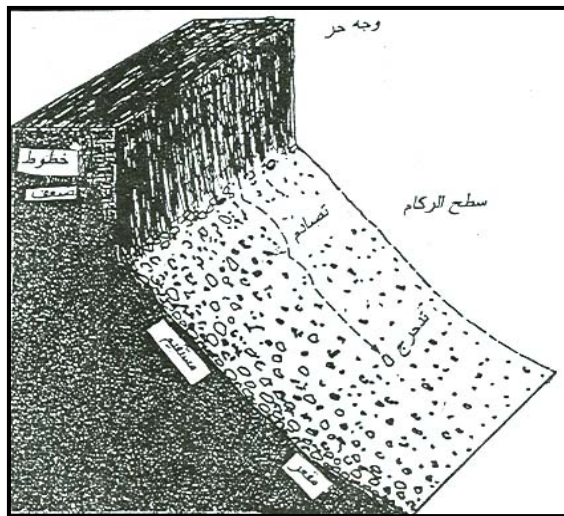
Wood

Convexity

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Basal Concavity

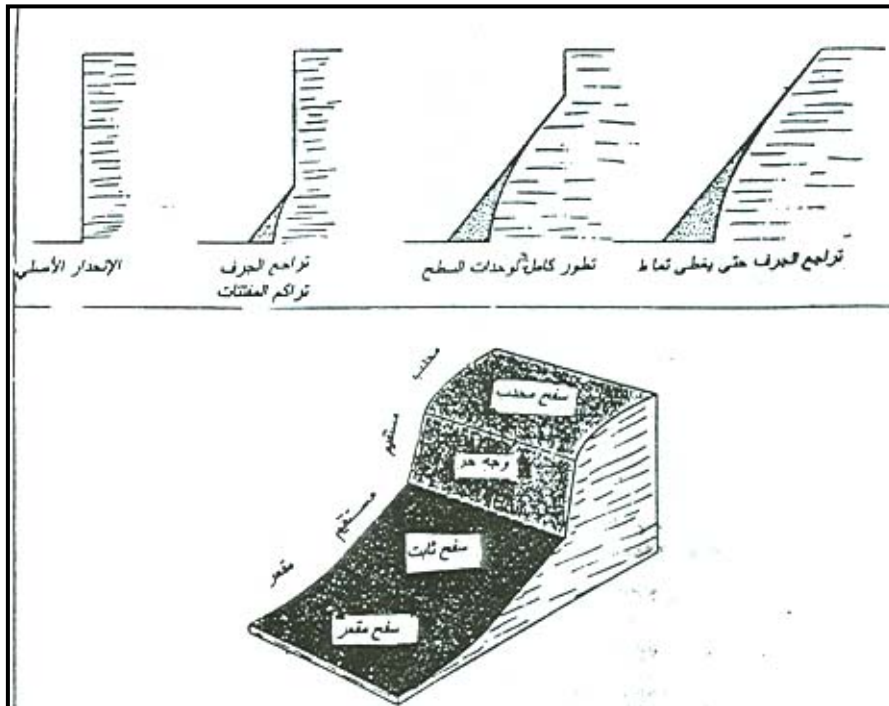
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:Free -

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:Constant Slope -

:Concave -

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A. Wood " "

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.Bed Rock ()

:Caine Model (

Caine

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(Wood)

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الفصل الخامس

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Original Surface

Pen plains ()

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distributaries

Tributaries

Drainage Basin

Open Natural System

.Outputs

Inputs

Base

.Level

Run Off ()

Discharge

Solar Energy

Vapors

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Velocity

Volume

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(34)

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:Hydraulic Action

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Turbulent Flow

Vertical Turbulence

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() Ripples

(P13 1978 K. E Sawyer)

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Cavitations

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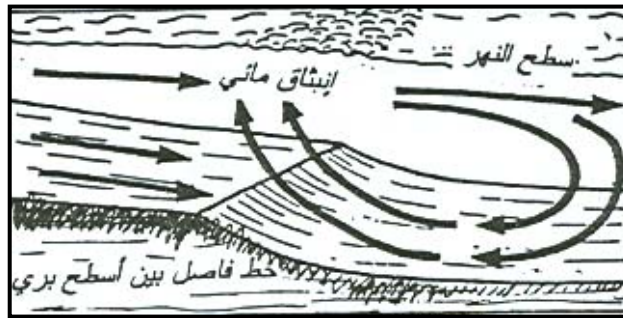
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Internal Friction

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Implosion ()

(P130 1982 H. M. D and Hanwell Newson)

.Explosive

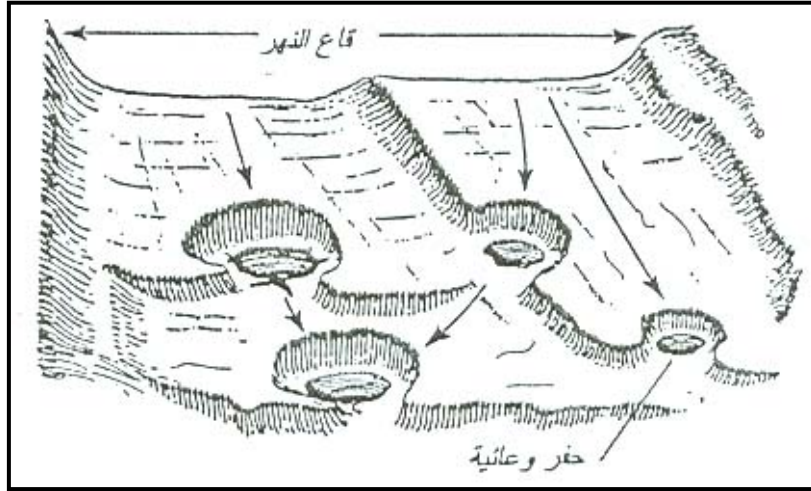
:Corrosion (

:Potholing (

Potholes

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Cavitations
.Abrasion in Potholes



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:Attrition (

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Corrosion

Cross Section

George Like

(P14 K. E Sawyer)

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Lateral Erosion:

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Undercutting ()

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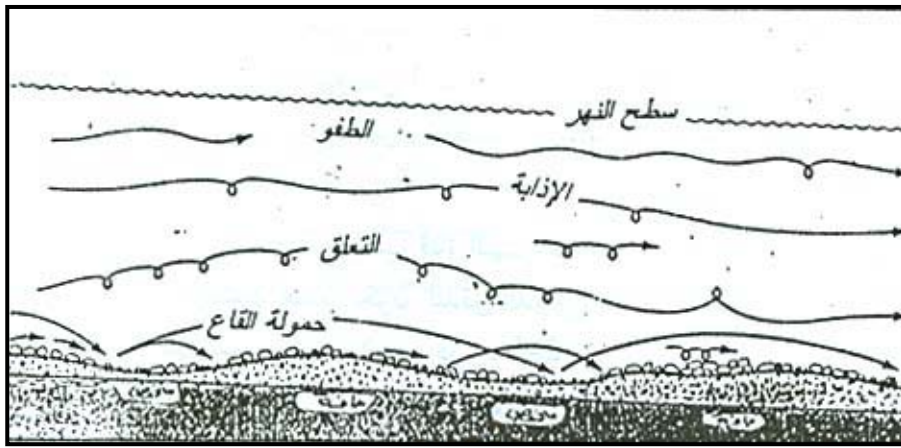
Head Ward Erosion

Shear Force

⁽³⁵⁾ Viscosity

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(River Load)

Bed Load

Dissolved

Suspended Materials

Satiation

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Rolling

(P8. K Sawyer)

Traction

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Dissolved Calcium

(36) High Flow

:Suspension :

Turbidity Currents

.Colloids

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P.P. M

105

Filter Paper

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.(P 47 1983 D Wilcock)

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After Wilcock 1983

:Bed Load :

Sliding Rolling

Competence Total mass of Materials

.(P 147 Newson and Hanwel)

"Ripples"

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(37)

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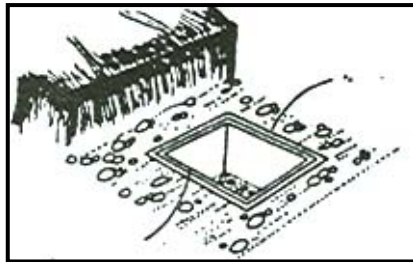
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) (38) Law of Transportation by Streams "

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:Salutations

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Fluvial Deposition

Porous

Pervious

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Well

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Sorted Deposits

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Natural Levees

Delta Apex

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Vertical

Erosion

W. Davis

.Youth Stage

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Flood Plain

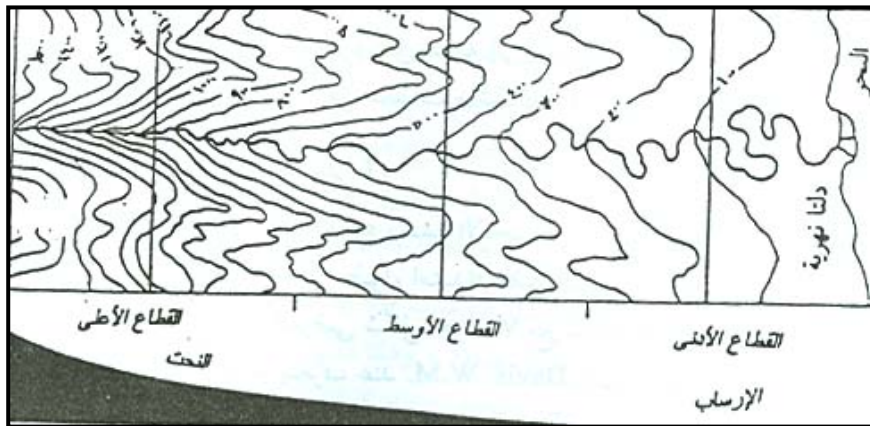
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.(Davis)

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Meanders

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Base Level

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Local Base Level

(41)

Time Factor

Davis. W. M

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Division Erosion Cycle

(42)

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The Upper

(43) Course

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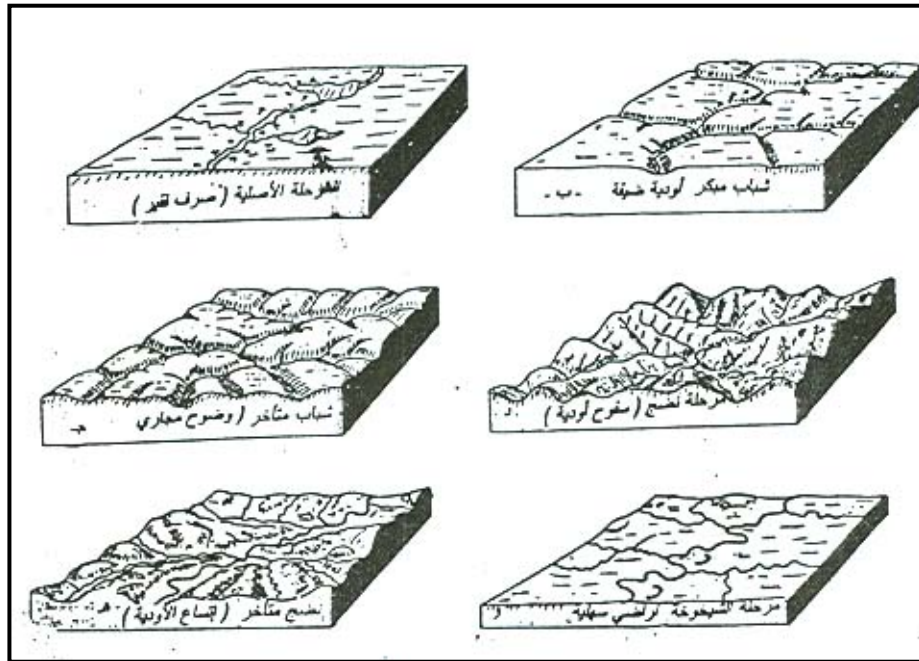
(41)

(42)

Initial Surface

(43)

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Lateral Erosion

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() Water Falls

Knick Points

Longitudinal Profile

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Isolated Gaps

Bending

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In incised

bed rocks ()

Meanders

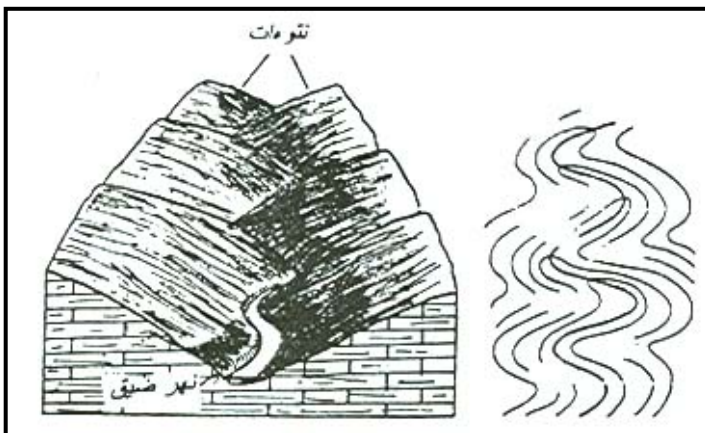
Concave Bank of the Bend

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- Interfluves Areas

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:Cataracts and Rapids

Rock Hardness

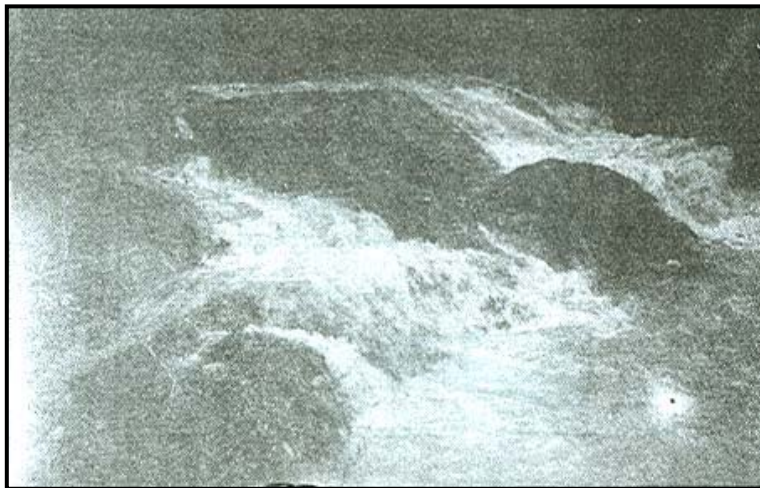
Sill " " Dyke

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(45) Rapids



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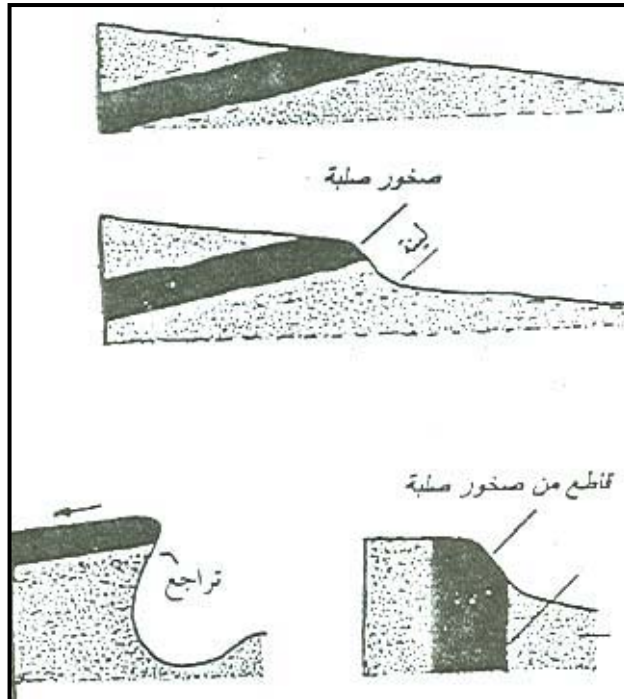
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:Water Falls ()

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Friable ()

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Fall Line

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Faults

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:Pot Holes

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Eddies

Cracks

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:Interlocking Spurs

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Spurs

Concave Side of Bends

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River Cliffs

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Convex

:Maturity Stage

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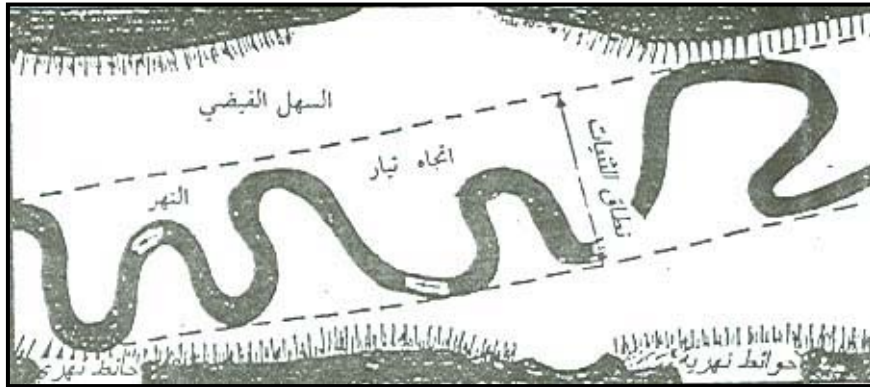
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Meanders

Meander Belt

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(47)

Interfluvial Areas

Terraces

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:Old Stage

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Oxbow Lakes

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Monad nocks

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River Meanders (

Flood Plain (

Incised Meanders (

River Terraces (

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River Deltas (

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Glaciations

Toppling ()

Failure

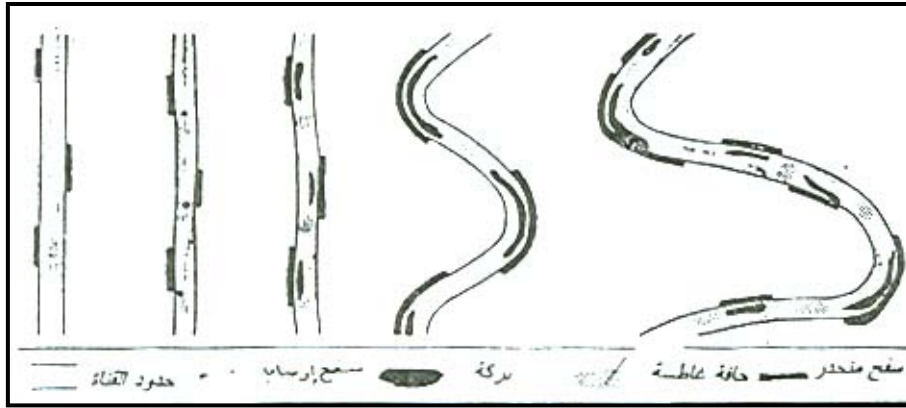
Meandering Streams

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(p Etal 1989 Knapp. B)

(48) Riffles

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Riffler

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Pools

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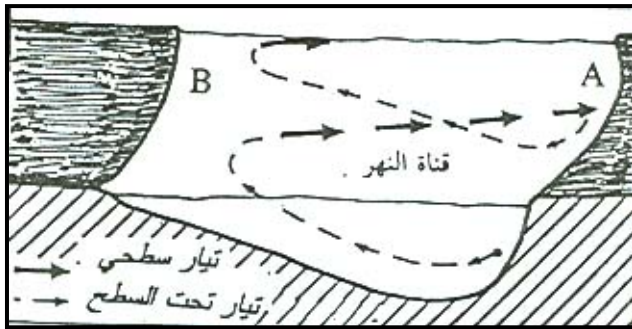
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Cross Currents

(B A)



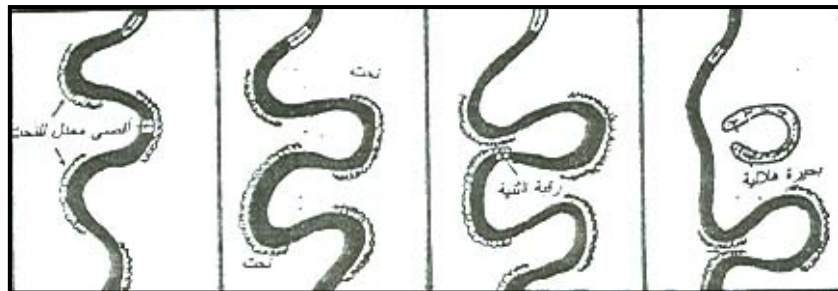
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(P 141 and Hanwell. J Newson. M) Cork Skrew Like Motion

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Minor Features



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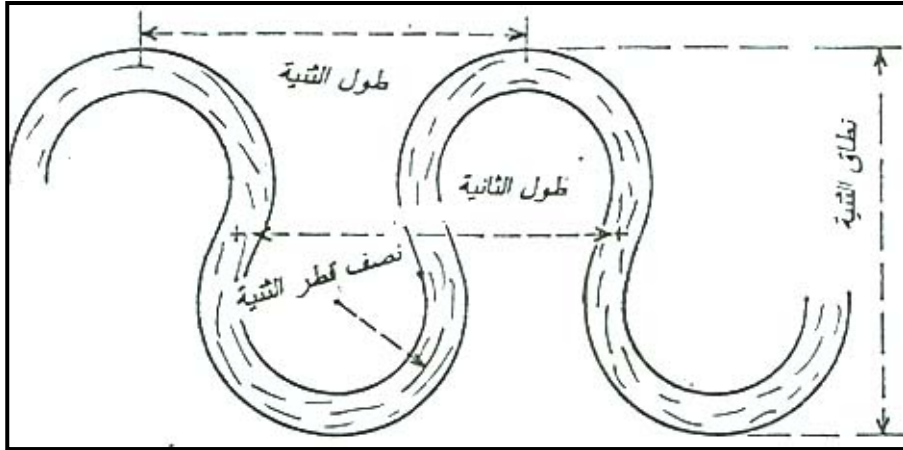
Meander Neck

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Silting Up

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Flood Plain

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Cusate Forms

.(p21 k. Sawyer)

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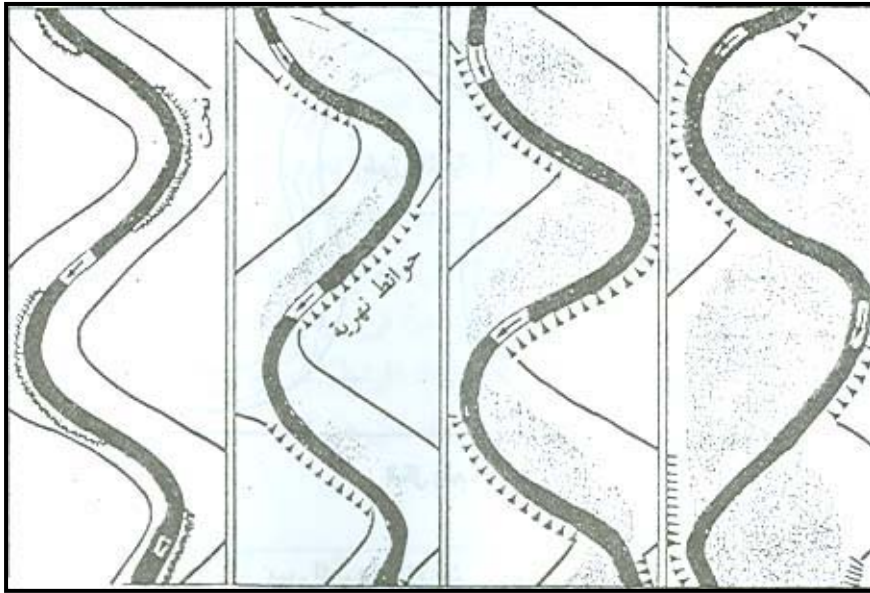
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.Downstream

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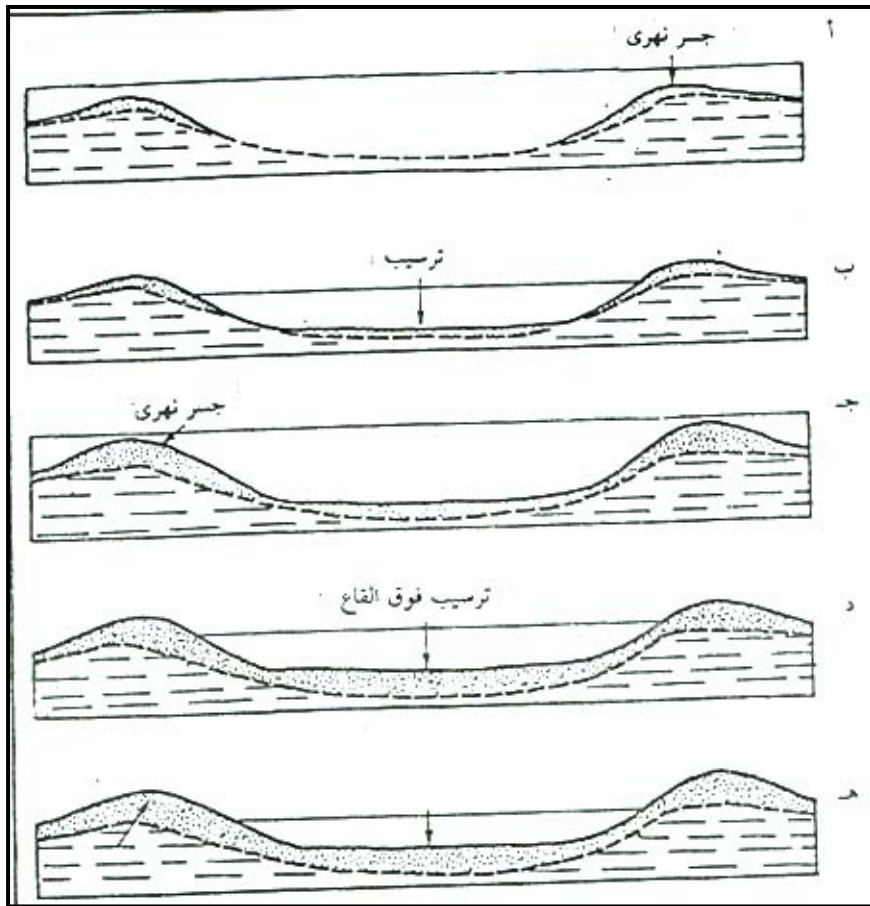


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:Natural Levees

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(1965. p61 R. B Bunnett)

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River Terraces

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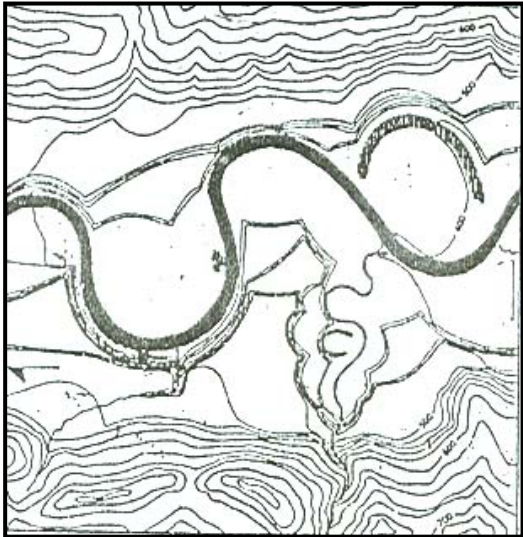
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(49) Rejuvenation

Terrace

Bench

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Knick Points



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(50)

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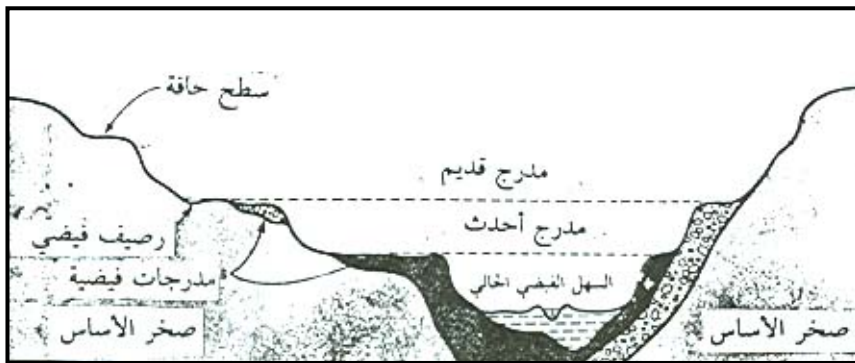
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(51) (Pluviation

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Structural Benches

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Incised Meanders

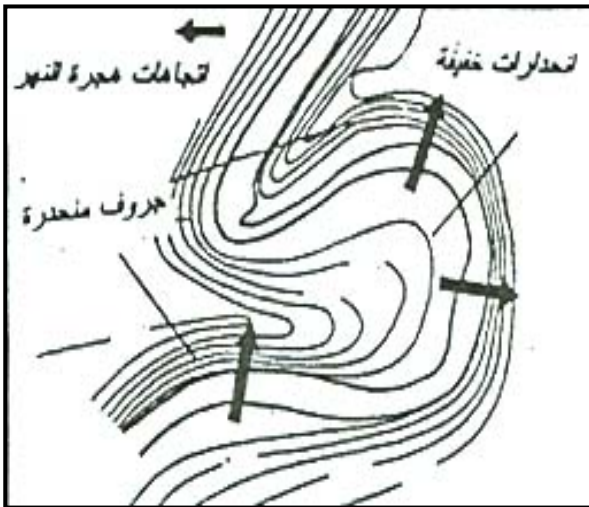
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Trenched Meander

Ingrown Meander



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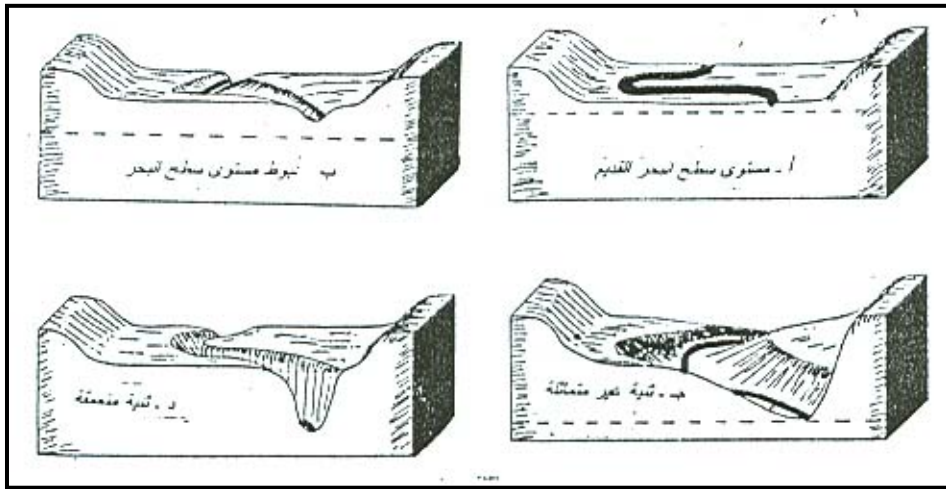
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Braided Channel

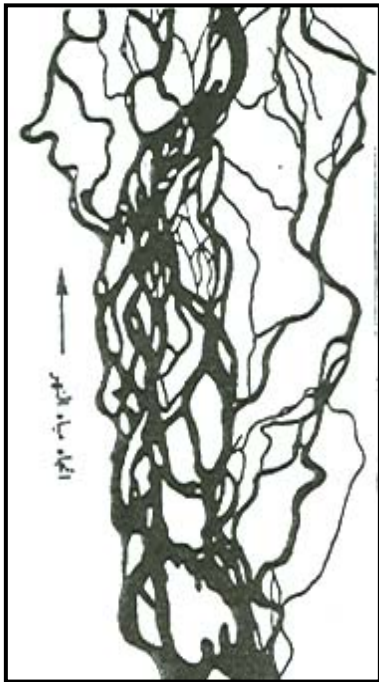
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Bed Load

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.(p 202 B. Etal Knapp)

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* River Deltas

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Deltaic Plain

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Distributaries

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Sand Bars

Spits

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Delta Hinter Land

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Upper Section

Lower Section

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(53)

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Flocculate

Estuary

Specific Density

Holmes

(Salinity

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Lateral Accumulation

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Turbidity Current

Long shore Drift

down warping

Lacustrine Deltas

Marine Deltas

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.(P28 K. E. Sawyer)

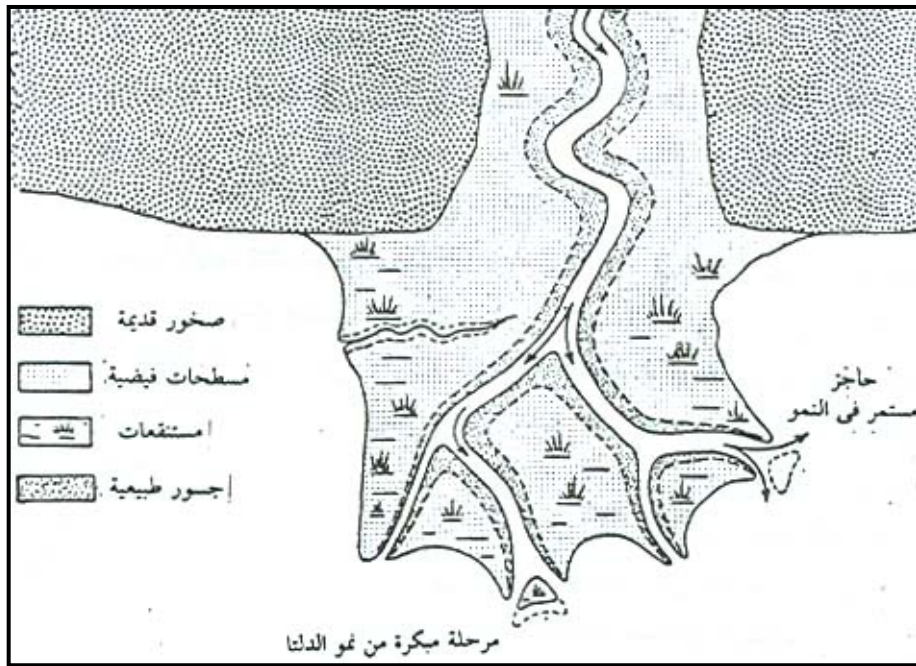
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Forest Beds

Topset

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Beds



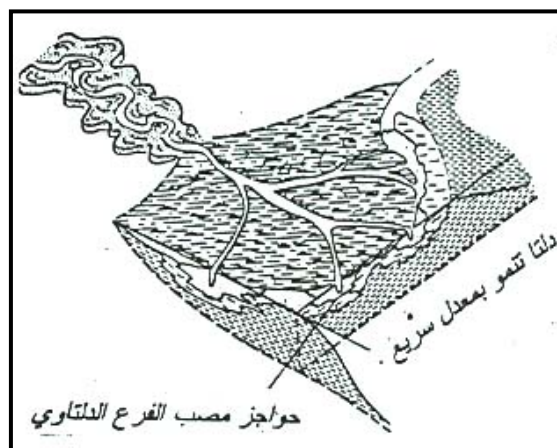
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Lagoons

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(54)



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Fluvial Deposits

(54)

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:Arcuate Deltas

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:Digitated Delta

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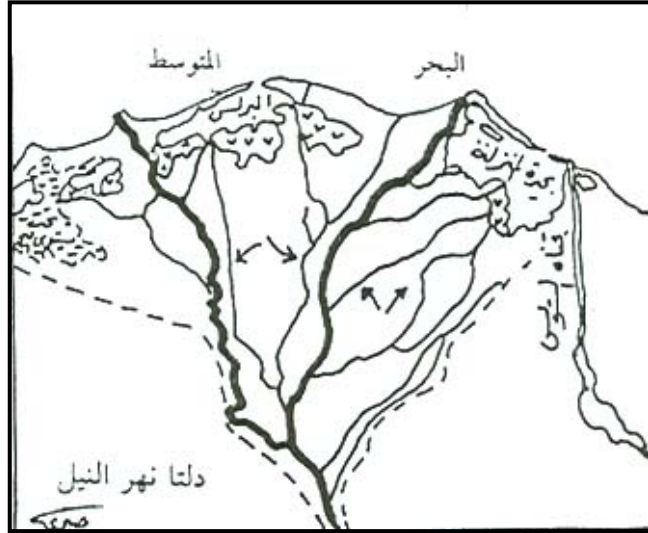
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:Estuarine Deltas

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(55) Submerged



Alluvial Fans ()

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Apexes

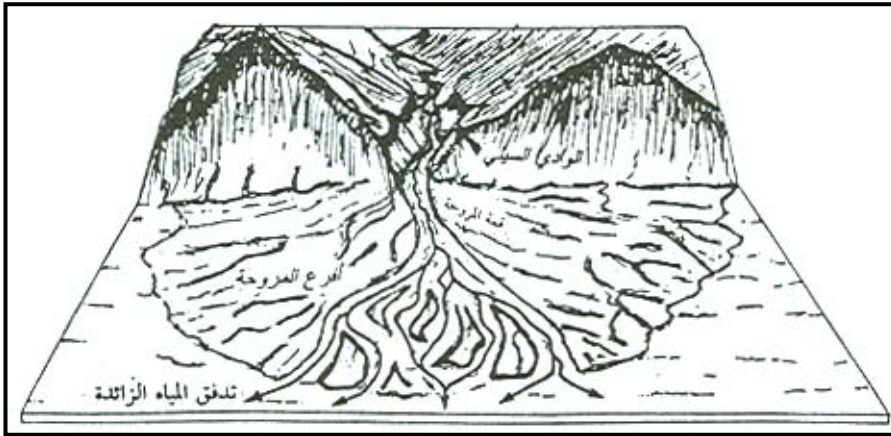
(56)

Braided

.Channels

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()⁽⁵⁷⁾ Playa Lake



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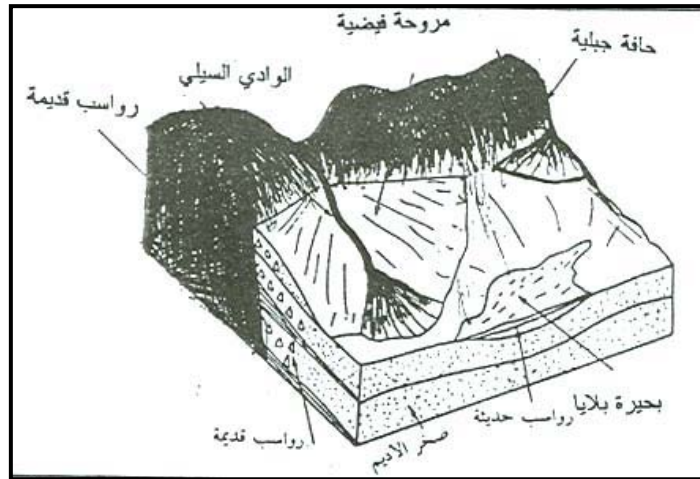
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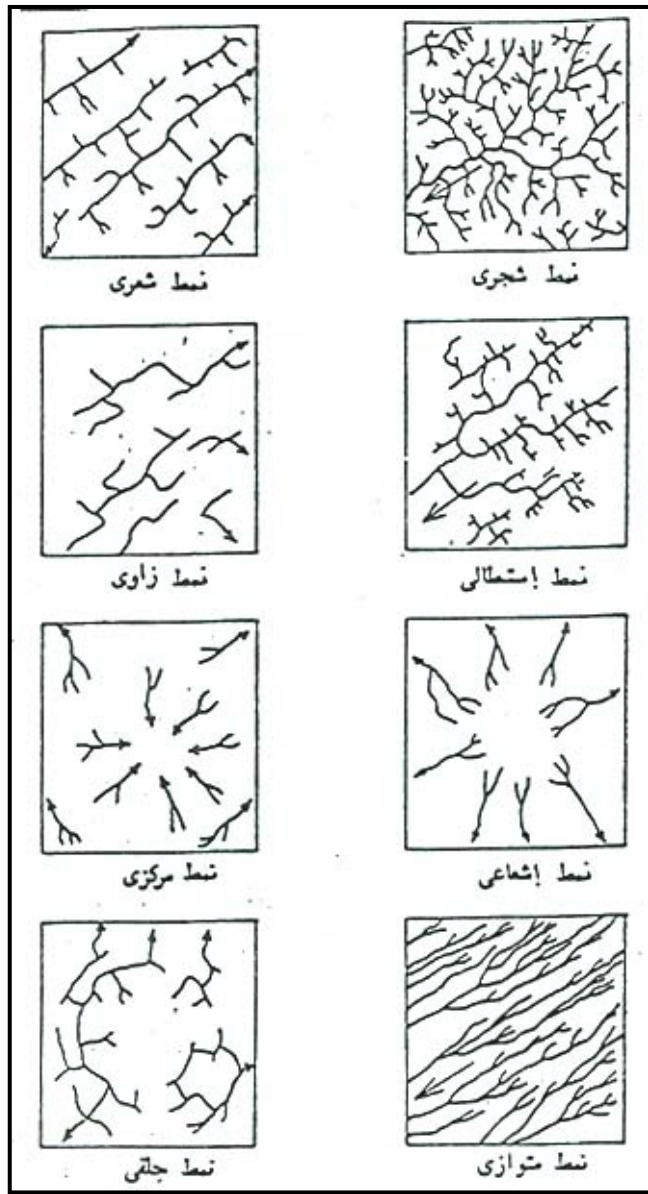
:Dendrite Pattern () (

(59)

Interfluves

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(59)



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:Trellis Drainage Pattern

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Friable

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Rocks

Escarpmnts

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Strike Line

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.Opsequent valleys

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:Rectangular Pattern () (

:Deranged Pattern (

:Annular Pattern (

Basins

:Radial Pattern (

:Centripetal Pattern (

Structural

.Depression

:Parallel Pattern (

(60)

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Water Divide

Initial Water Divide Line

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River Capture

Wind Gaps

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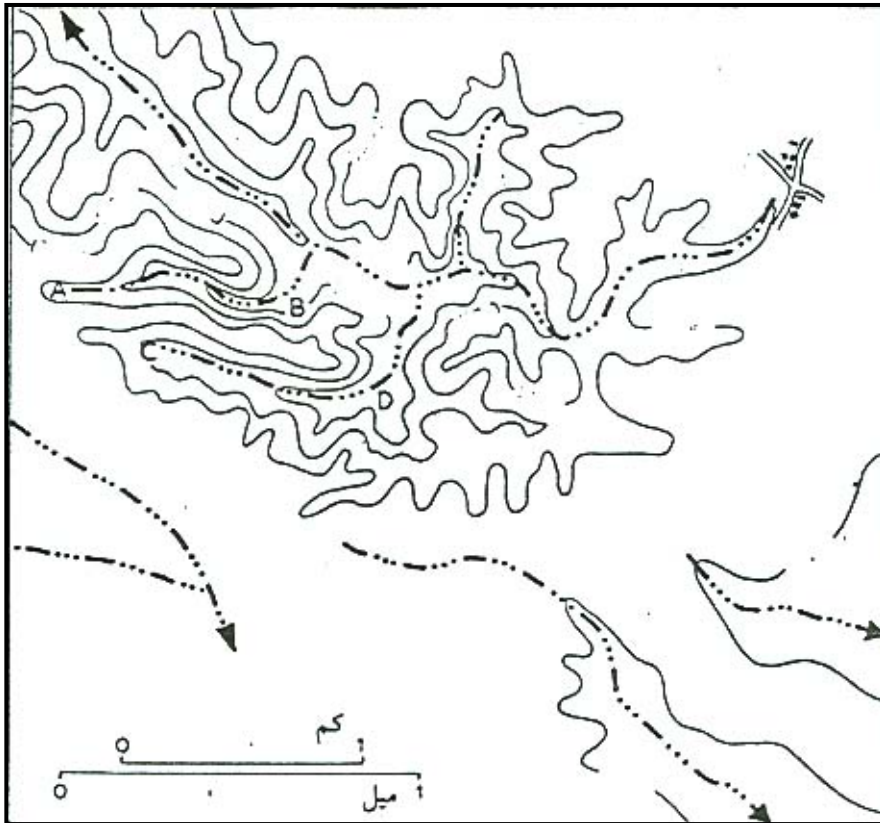
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Elbows of Capture

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Consequent Rivers

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Subsequent

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Morph metric analysis

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Quantitative Means

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Matter and Energy

Drainage Basin System

Properties

Total Relief

Channels Frequency

B.G (Basin Geometry)	:
AU	-
LB	-
BR	-
BP	-
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Wentworth Equation			

Melton 1958

(J and Goodlett 1960 Hack)

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:Nose

.Spurs

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Linear Patten

:Gaps

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:AU

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Digitizer

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:Basin Width

:Basin Length

Schumm

Maxwell 1960

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Divider

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:Form Factor

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$$^{(62)} F = A + L_b^2$$

L

Basin Area

A

L_b^2 ⁽⁶²⁾

:(R_c) Basin Circularity (

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First and

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Second Orders

:(E) Basin Elongation (

Diameter of Circle

L_b

(63)

:Lenth/ Width Radio () (

Muller

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:Compactness Coefficient (

Perimeter Length

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$$\frac{\text{---} \times \text{---}}{\text{---}} = \text{---}$$

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:Relief Ratio (

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.Schumm

:Relative Relief (

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:Average Slope (

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Wentworth

:Elevation Relief Ratio (

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Hardness

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Bifurcation Ratios
Volume

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:Bifurcation Ratio () (

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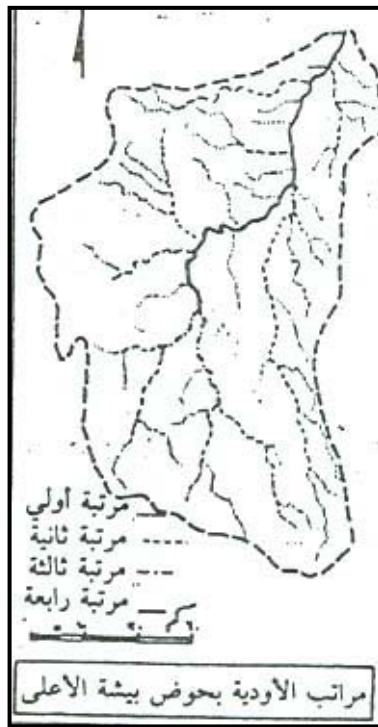
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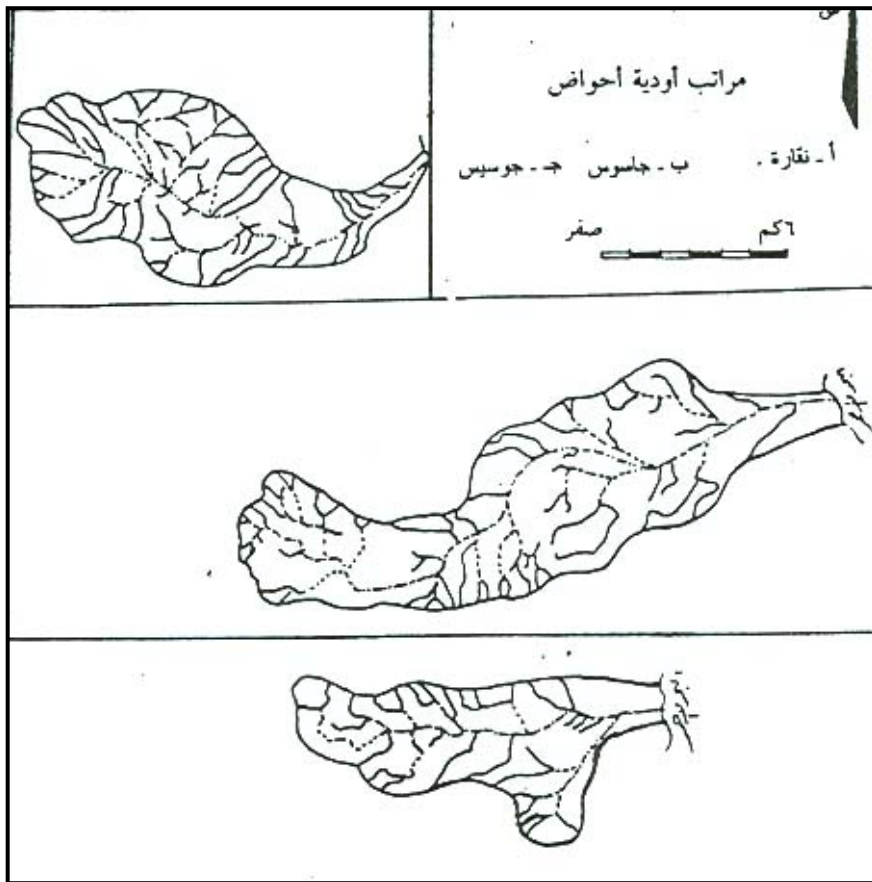
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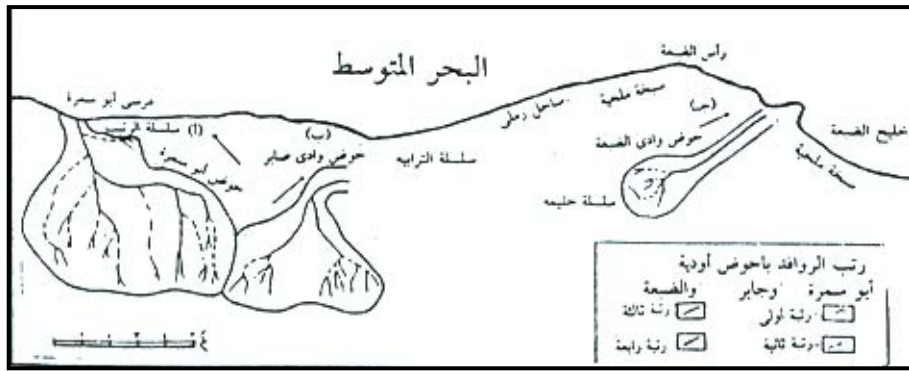
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الفصل السادس

(66) Meteoric - Water

Highly Porous and Permeable

.Reservoir Rocks

Juvenile Water

Connate Water

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Capillarity

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Under Ground

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:Porosity (

Unfractured

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⁽⁶⁷⁾ Angular Particles

Packing

Angular

Rounded

⁽⁶⁷⁾

Tabular

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:Permeability ()

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Viscosity

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Permeable

Impermeable Rocks

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Pumice

Pores ()

Grains – Size
Sandstone

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Pervious – Rocks

Cracks

Evaporation Rates

⁽⁶⁸⁾ Precipitation

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Mudstone

Non Pervious

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Underground Water Table

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Permanent Streams
Shores

Swamps

Ponds

Ball. J

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(*)

Seepage

1982 A and Strahler A Strahler)

Excavations

(p272

Organic Materials

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(69)

Saturation zone

Suspended
zone of Intermittent Saturation

zone of permanent

saturation

(*)
(69)
Soil Moisture ()
.Intermittent Zone ()
.Capillary Fringe ()

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Hydraulic

Percolation

Gradient

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Floating

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Solved Salts

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.Litho logical Conditions

Carbonic Acid⁽⁷⁰⁾

Karst

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calcium Carbonate

(70)

Insoluble

Bicarbonate

(71) Corrosion

Solvent Capacity

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Percolated Water

Corrosive Capacity

(p199 1968 Pitty A)

Subterranean

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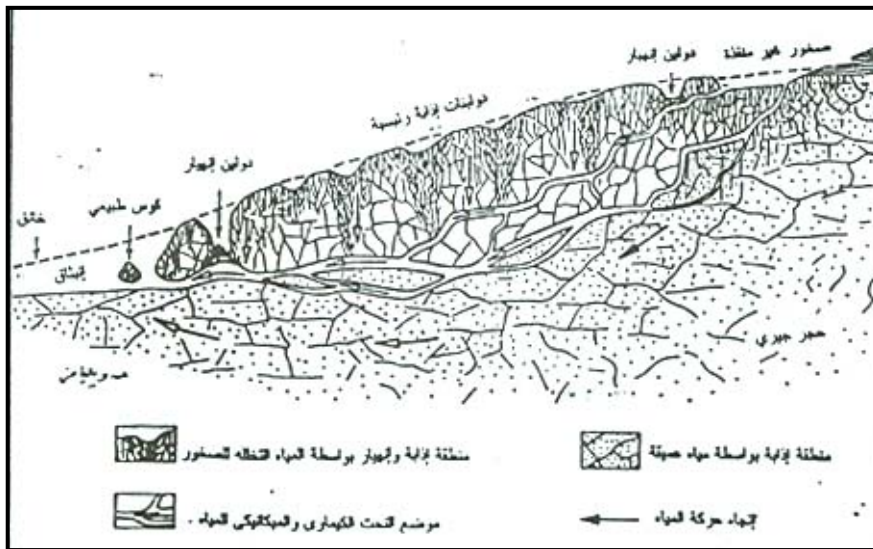
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Collapse

(p 111 p. 1977 William)

Solution Depressions

(p110 p. w William)



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Drift Do lines

Selective Solution

Underlying Rocks

Chemical and Mechanical

.Suffusion

Subterranean Flow

Erosive Effects

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Sinkholes ()

J W. K and Howard Hamblin)

.(p98 1975

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:Initial Stage

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.Solution Valleys

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Bed Rock ()

Conical Knolls

:Karst Landforms

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:Sinkholes () (

Sinkholes

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Cavernous

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(1971 Jennings)

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:Solution Sinkholes

Swallet Sinkholes Swallow holes

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:Collapse Sinkholes

.(Polje " " (Dolin)

(72)

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(73)()

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Collapse do lines

Solution Do lines

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(72)

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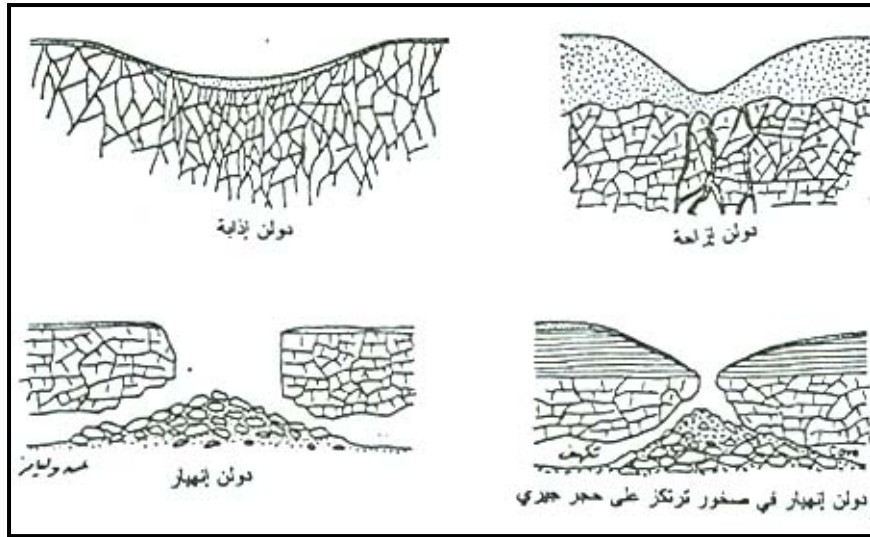
(73)

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Excavating

(P116 P. W Williams)

Shape



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:Do lines Density

:Relief Enerfy Rates

Bal chin

Coleman

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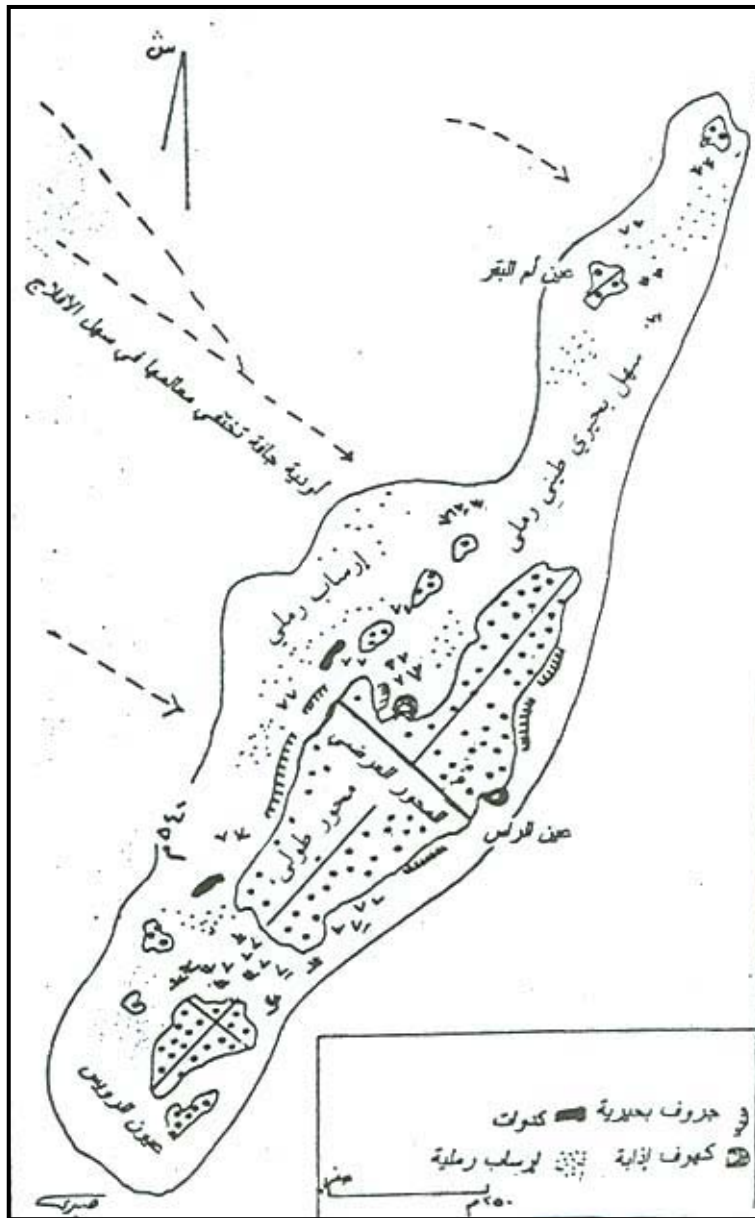
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:Bogaz () (

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Lapis

Clients

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Joint Systems

Separated Blocks

Greeks

() Clients

Limestone Pavement

.(P121 K. E Sawyer)



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Pluvial Periods

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Concretions

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Boulder Fields "

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:Karast Caves

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Mammoth Cave

Major Can " "

Ooze

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Down

Ward Growing Stalagmites

Ward Growing Stalactites

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Travertine Pillar

.Halictite

Evaporates

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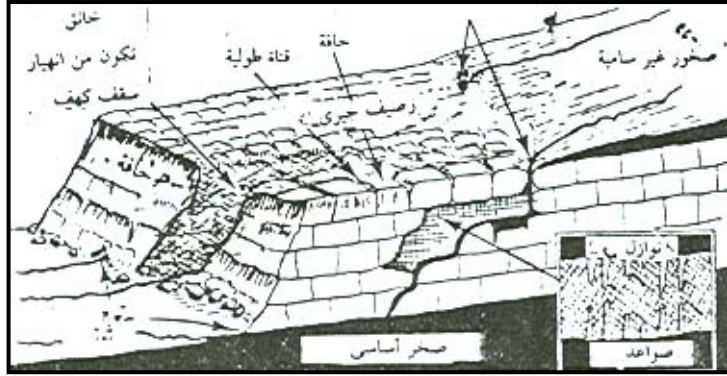
Spongy Rock

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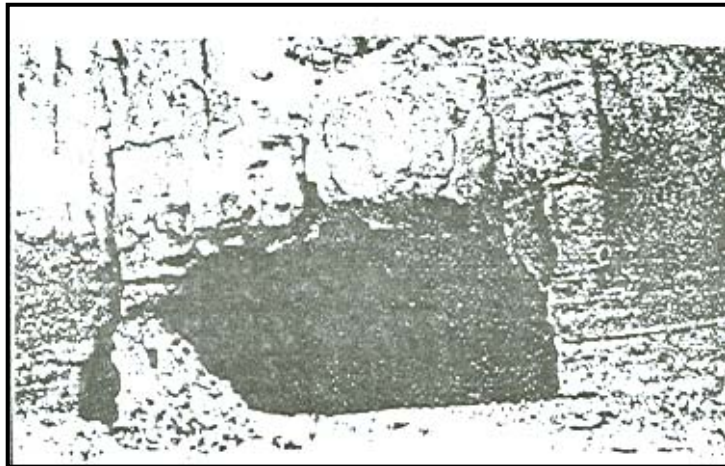


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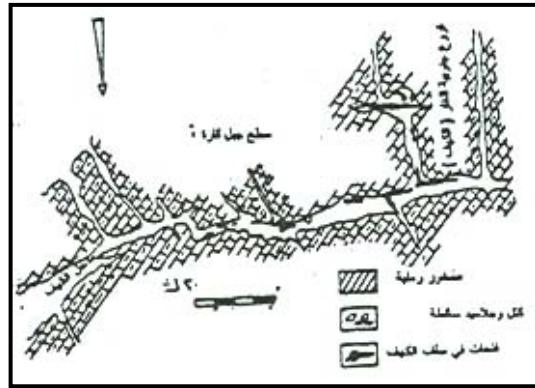
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Rounded

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Gravels



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Subterranean Streams

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Swallow Holes

Enclosed Basin

Sinking Stream

Fissures

Corrosion

Blind Valleys

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Lateral Solution

(74) Karsts Margin Polje



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(Williams p113)

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Resurgence

Natural Narrow Arches

Junctions

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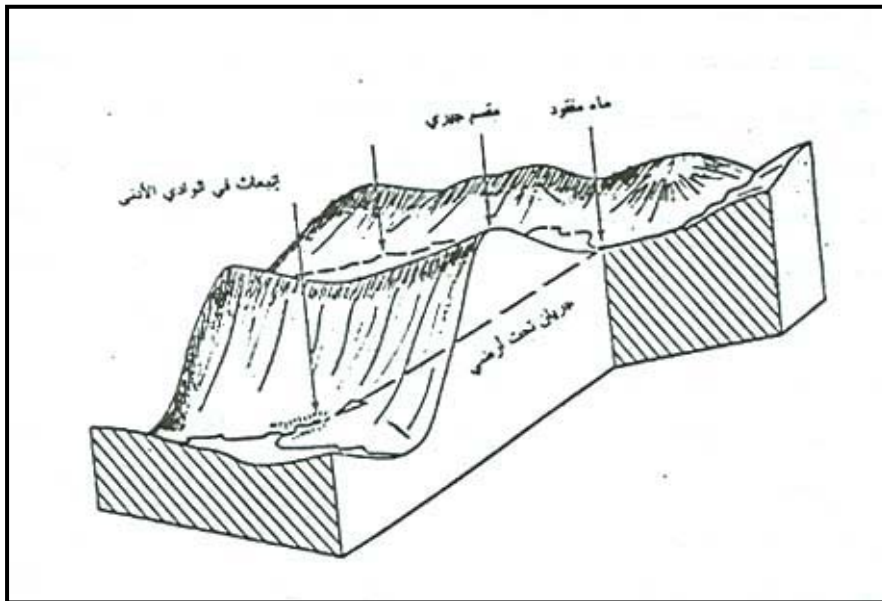
.Geysers Hot Springs

- Water Meteoric -

Unveiled Water

Magma ()

Hydrological Cycle



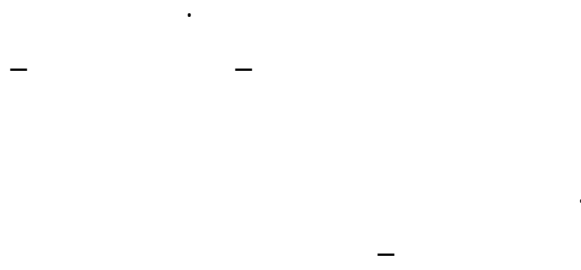
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Old Faithful Springs

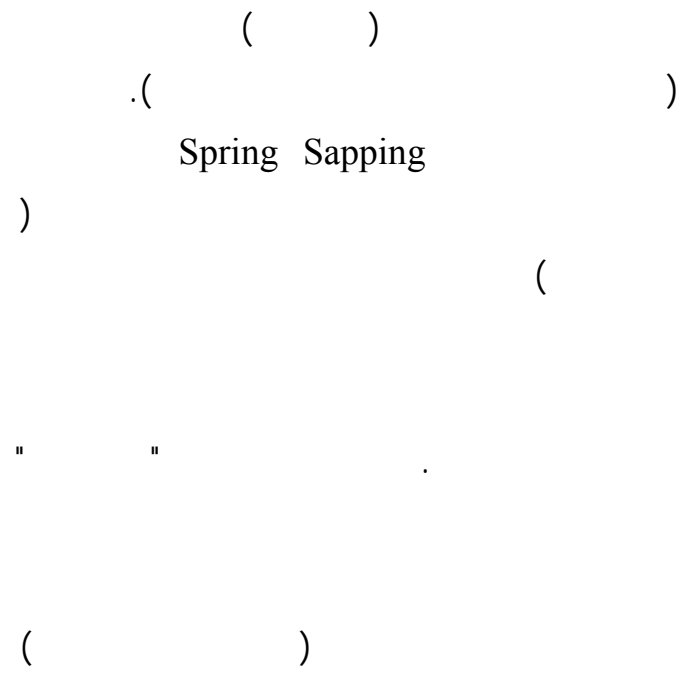
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Depression Cones



Lacustrine Deposits





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Replacement

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Organic Matter

Lithification

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Petrified

Veins

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Voids

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Styoliteo

Differential Solution

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الفصل السابع

Direction Velocity Duration
- - ()

Landsberg 1956
(p85 1979 A. Warren)

Arial Wind Speed Processes
Grain Cohesion Surface Roughness
Vegetation Cover Size

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Laminar

Particles ()

Shearing Force

Gravity Force

Friction

Ballistic Impact

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Bernouly

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Salutation

.(p33 - 35 R and Doornkamp Cook) ()

:shearing (

Bagnold

.Voids

.Wind Entrainment

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Salutation

Trajectory

.Avalanching

Abrasion

Wind Energy

:

:Gravitation (

Specific Gravity

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and Doornkamp R Cook)

Chepil

(pp 55 - 56

:Cohesion (

Platy

Wetting ()

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Woodruff

Cheipl

% -

% - % -

:Friction (

Refraction

- Variables -

Fetch

() %

Aerodynamic

.Badland

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:Desert Pavements

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Bagnold

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Boulders

Gibber plains

:Vent facts ()

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Grooving

Abrasion

Sandstone " " Hail

Three Facetted

Driekanter

Zweikanter

(p210 Flint and Skinner 1977)

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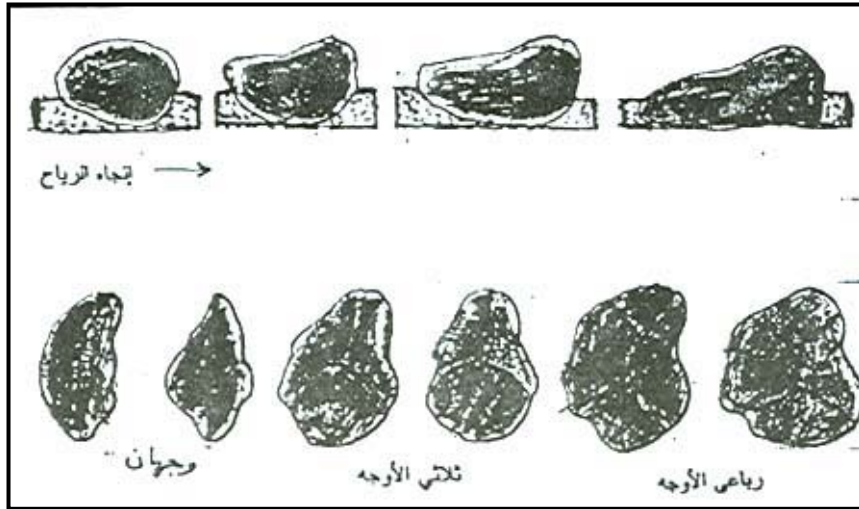
Sugden Flint and Skinner () ()

1974

() Fracturing

1970 Glennie

(p165 1979 E and etal Derbyshire)



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Sharp 1964

Warren

Cook

Aerodynamic Processes

:Rock Pedestals

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Rock Masses

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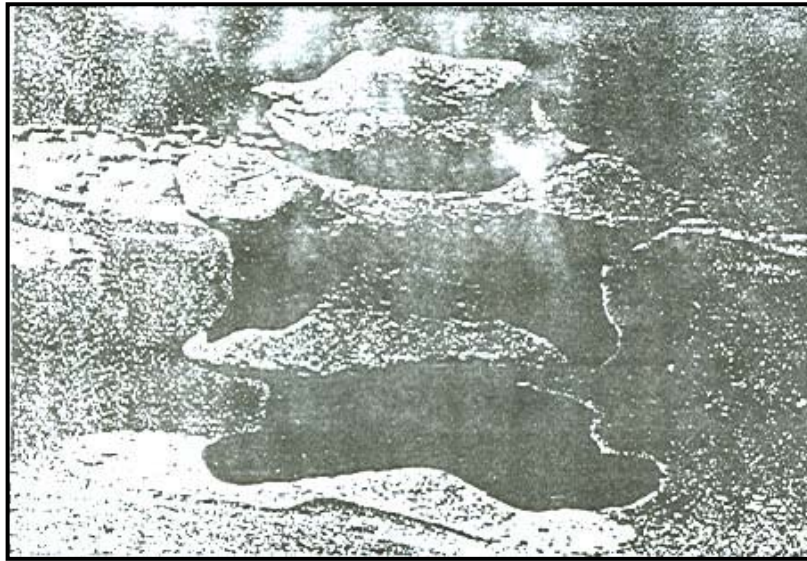


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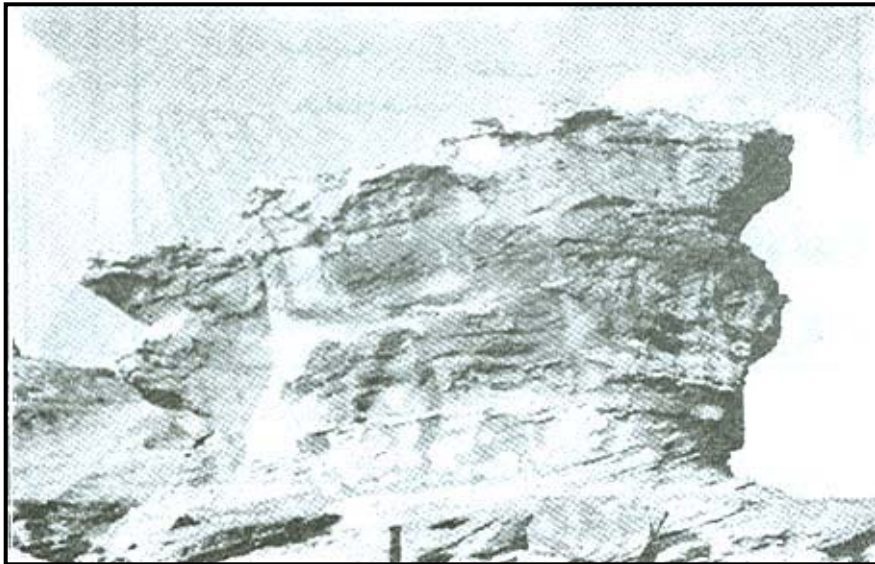
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:Zeugens

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Furrows



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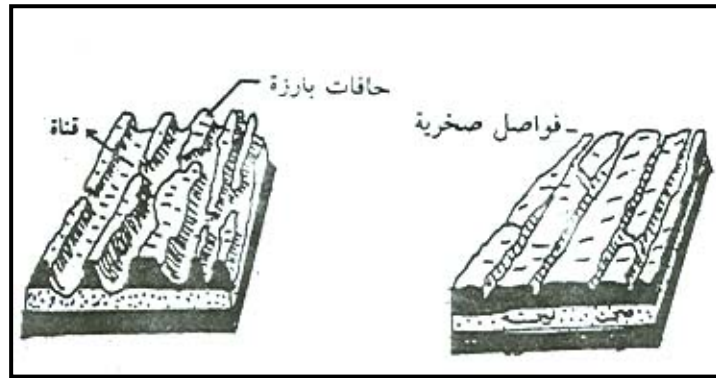
Joints

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Differential – processes

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(75)



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:Yarding (

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:Inselbergs (

Surrounded Escarpments

Rounded

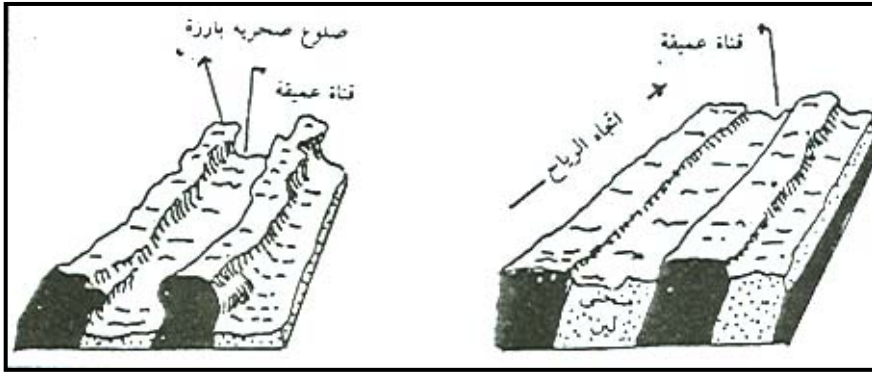
Inselbergs

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Flat Topped Inselberg

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Rounded Topped Inselberg



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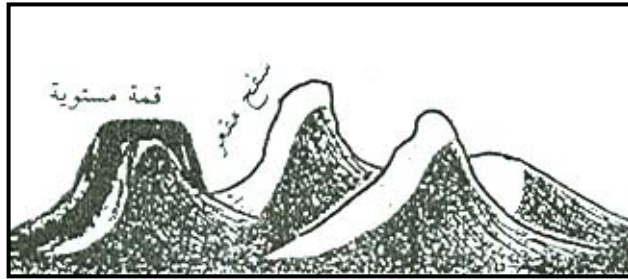
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Bedding

Planes



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Isolated Hills

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:Hummocks

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Cores

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J Ball

Lacustrine

Pluvial – Period
Deposits

Ball

.(p7 1950 C. Thompson)

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:Desert Depressions

Unconsolidated Deposits

Deflation Hollows

Bank kiang

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Pellets

.(p 327 A. H A and STRahler Strahler)

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Underground Water Table

.(pp. 289 - 299 1933 J Ball)

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Abrasive Tools

(76)

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.(p 477 1978 A. Holmes)

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Suspension

Creeping

.(77) Salutation

Rolling

:Fine Particles

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(76)

Mc Gee 1908 Leap

, Saltare

(77)

Joly 1904

Platy Shape

Laciers

Suspended Load

Loess

(p. 145 1979 I. Statham)

p55 U and Doornkamp Cooke ()

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.(p146 I. Statham)

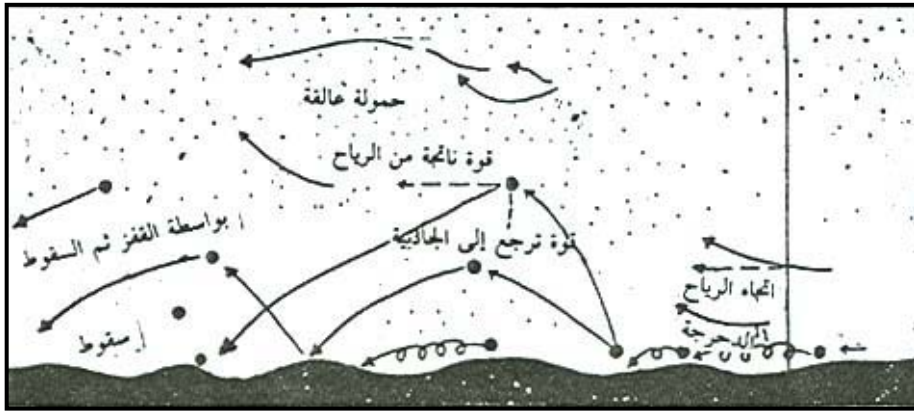
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Bagnold

.(p332 1979 A. Warren)

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1973 HSU

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$$^{(*)} (\quad / \quad) \text{ Gravitational Constant} =$$

.(p332 A. Warren)

Chepil

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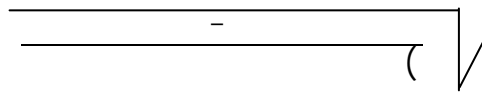
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Chepil

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(p55 u and Doornkamp Cooke)

Grain Size

.Turbulent Flow of Air

Sorting ()

Ripples

Bulk Transport

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High Viscosity

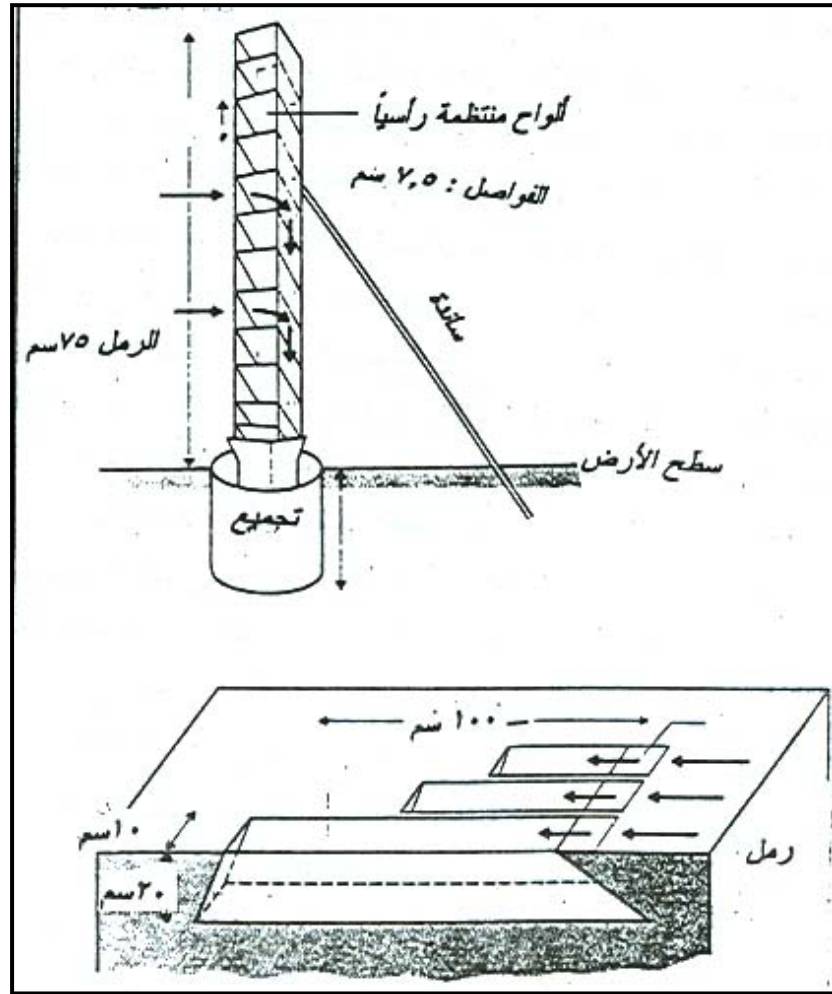
.(P 176 I. Statham)

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Sand Traps

1960 Horikawa and Shen

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.(p 131 1978 C. A. King)

Vertical Sand Traps

Bagnold

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Storms

Bagnold

1964 Belly

Wind Tunnel

Pitote Tube

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King)

Bagnold

.(192 p 1978 C. A.

.(79) Fetch

Belly

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Wilson

.(175 and E others Derbyshire)

Storms Frequency ()

Sand Dunes

Bagnold

Dunes Building Wind
(p 134 H. C. A King)

Transverse Dunes

Ripples

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.Violent Bombardment

Mound

Transverse Ridge

Bounding Surface

Mega Ripple

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Bagnold

Mega Dunes

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Lee Wind

Mound

Wind Ward Side

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33 ()

Bagnold

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Beadnell

Bagnold

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Beadnell

Murry

Corridors

.(pp427 - 428 W. G. Murry)

Mega Dunes

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Ripples and minor Ridges:

Wave Length

Fetch

Height/ Wave Length ratio

(80)

.Surface Grains

.(pp205 - 225 1941 Bagnold)

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McKee, Goldsmith 1979

(80)

.Impact Ripples

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(Sharp 1963)

Kelso

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Bagnold

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Sharp

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(81)

Primary Dunes

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.(Sharp, 1963)

:Longitudinal Dunes (

Bagnold
Helicoidally

Bagnold

Tibbitt and Mckee Bidirectional Wind
Two Wind Resultant Theory

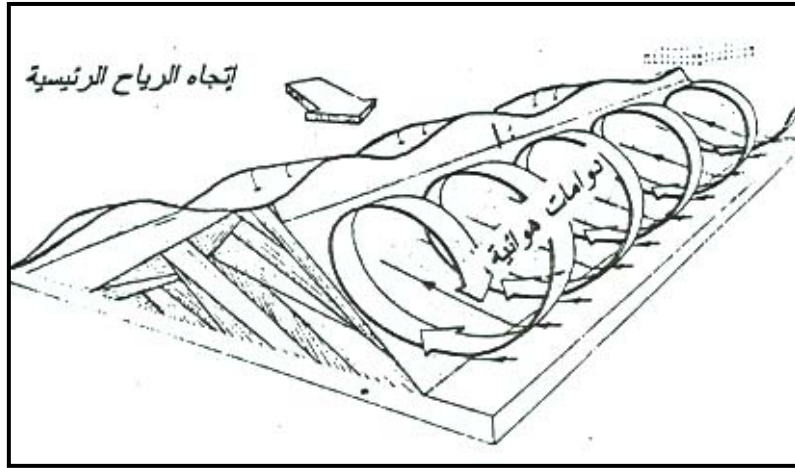
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Homles

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Bagnold
Glennie

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Bagnold

(Dry Late Wisconsin)

Warren

.(p339 A Warren) "

Clos

Folk

Seiche type

Clos

Cores

.(p178 Etal Derbyshire)

Fairbrdge

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(p296 1969 W. D. Thornbury)

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:Barchans () (

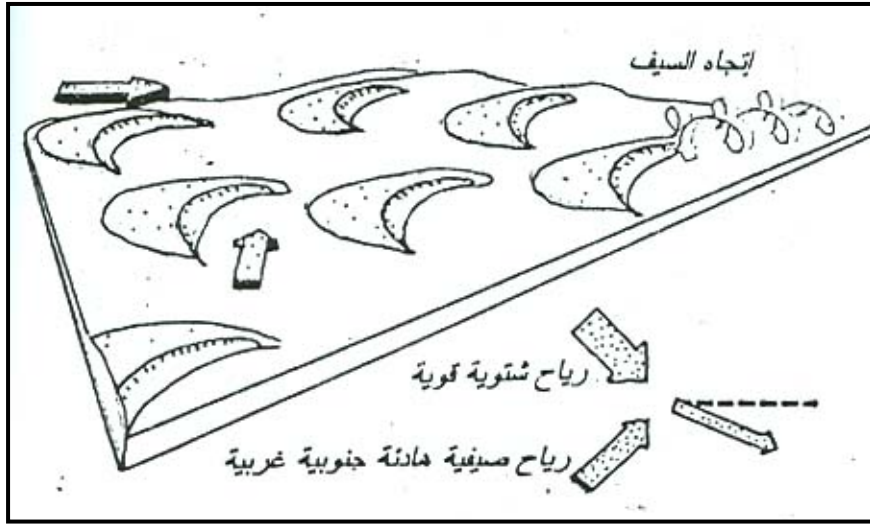
Unidirectional

Wind

Wind Ward Side

Convex Shape

() Concave



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p1370) Slipface CAM (King

Long and Sharp

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Brink

pp181 - etal E Derbyshire)

.(182

1967 Hastenrath

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: Hastenrath

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(pp54 - 59 1967 s. Behiry)

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Sharp Cooper

Hoyt

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Hoyt

Lee Eddy

.(p338 A. Warren)

Warren

Transverse Dunes

(82)

.(p298 W. D. Thornbury)

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.(p 84 1978 J. D Collin son)

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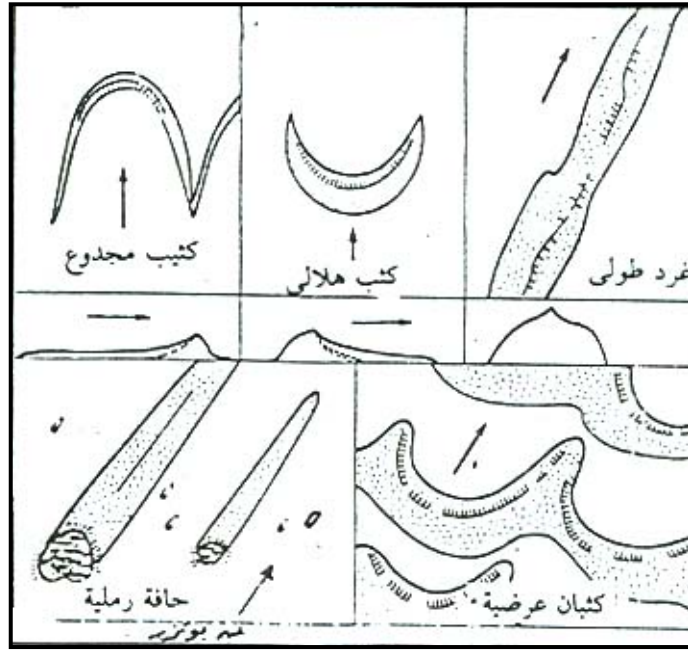
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Oval Dunes

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Send Sheets



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Cliff Coasts

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Submergence

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Eustatic

Fluctuations

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- - Inherited Landforms
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Cliff Recession

: Wave Quarrying ((

Near Shore
Rocky Shores

Plane of

Minor Cue stats Quarrying

:Wave Abrasion () (

Debris Attrition

Notches

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Pebbles

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Wave – Breaking

Explosion

:^(*)Water Layer Weathering (

(1949 Hills)

Drying

Wetting

Cavitation

(*)

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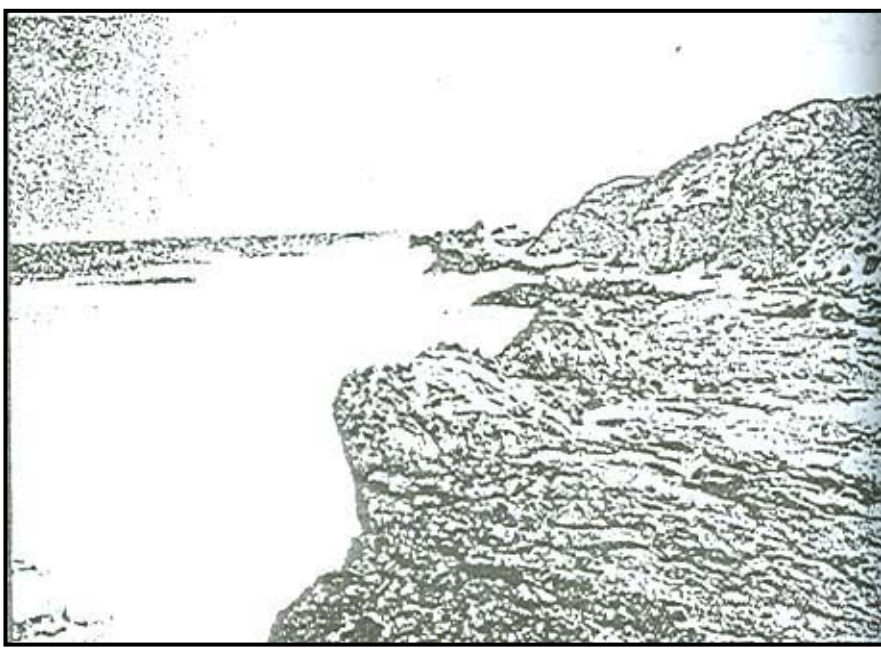
Hydrolysis

.Hydration

Sprays

Permanent Saturation Zone

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.Dif of Strata

Semi Durnal

Durnal

and Mixed

:Solution

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Cloud

Reveile and Emery

photosynthesis

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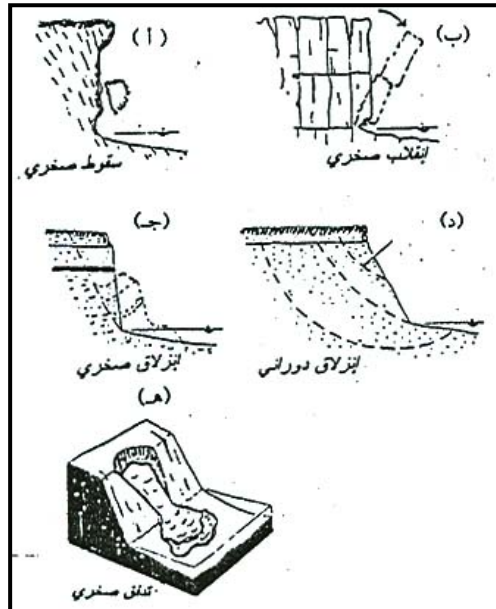
(

Emery

Mass Wasting

Rock Fall

(1987 Williams and Davies)



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Toppling

Vertical

Warden

(T Sunamura)

Jointing

Sheppey

(p 107 1992

Shearing Displacement

Distinct Slip Face

Rotational Sliding

Planar Fliding

() Linear

Circular Plane

()

:Flows

Mudflows

Mudslide

More

Gently Sloping profile

Undercutting

Thant

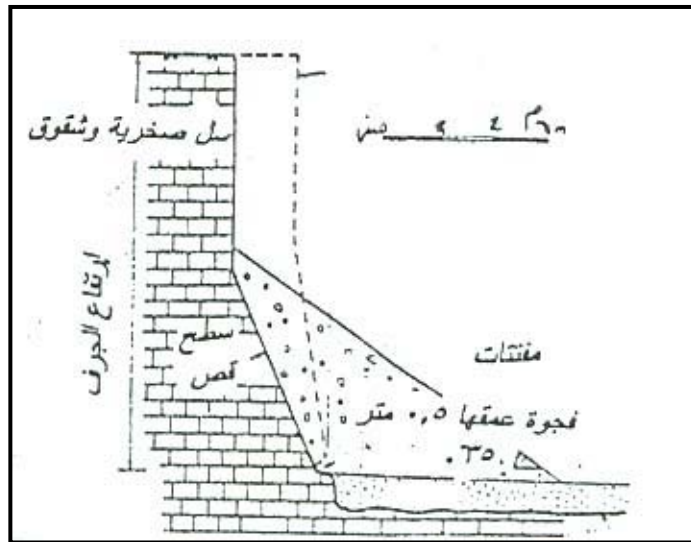
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(1984 Hutchinson)

Tensional Crack

Shear Failure

Awave – cut – Notche



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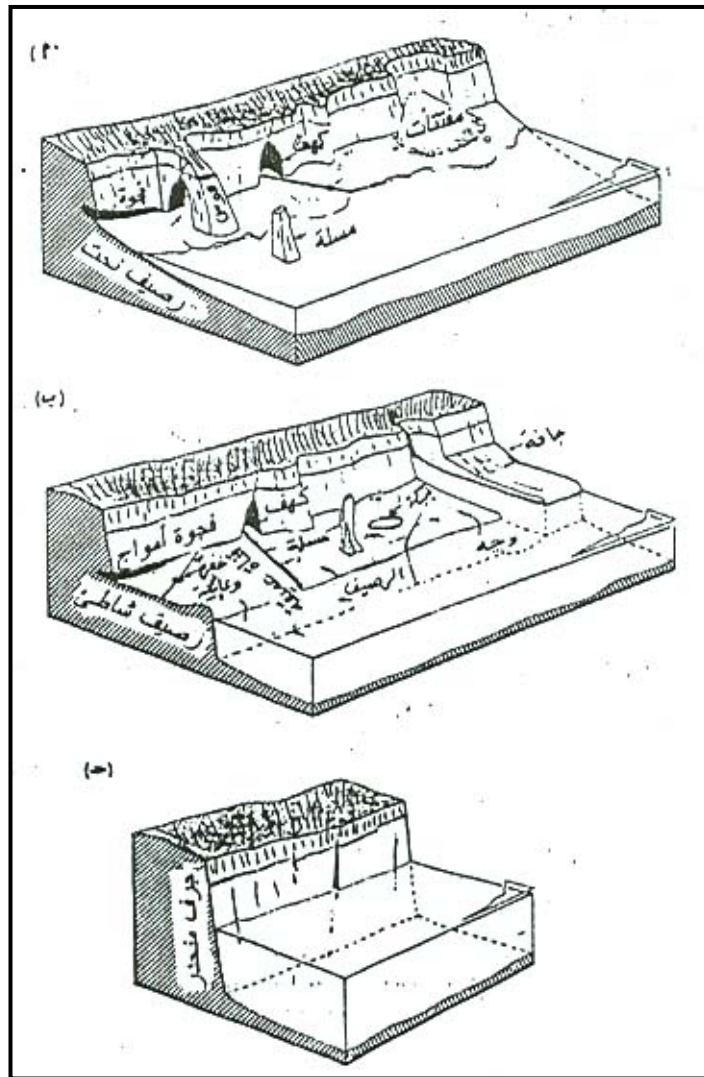
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Stacks

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Plunging Cliffs

(1968 Cotton)

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Banks

Cotton

Cotton

Bird

T. Sanamura)

.(p144

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Quarried Rocks

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Cailloux

Tricart

J. L Davies)

.(1978 p92

Davies

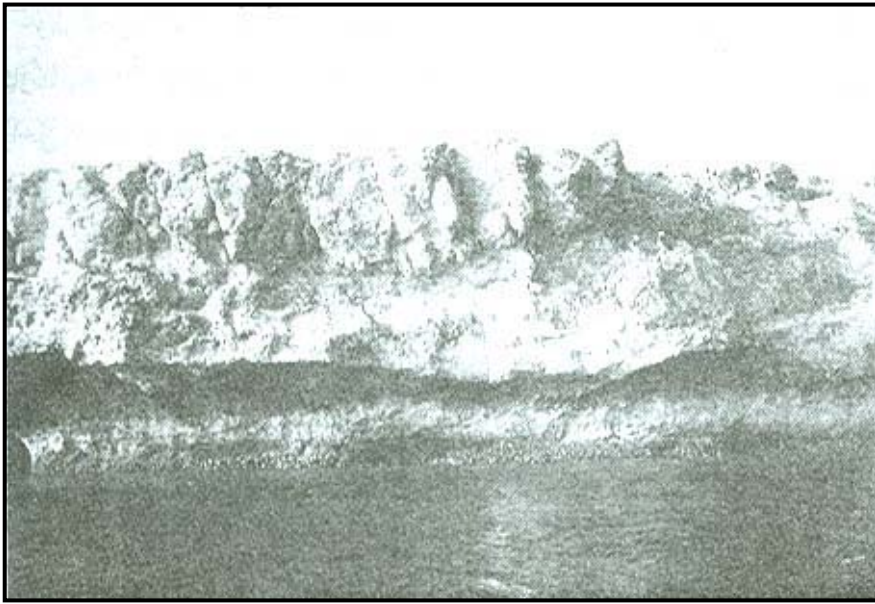
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Visors

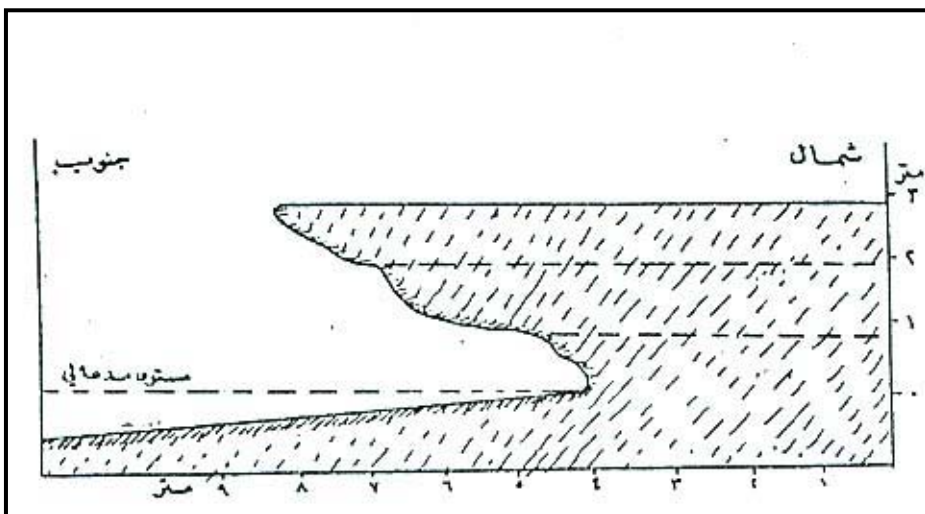
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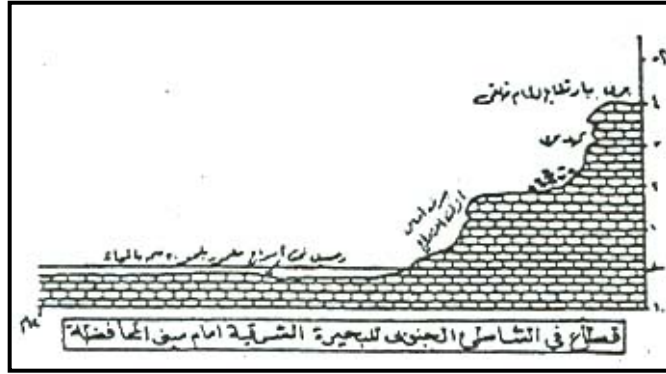
(1978 Bird)

Slope Over Wall

Bird

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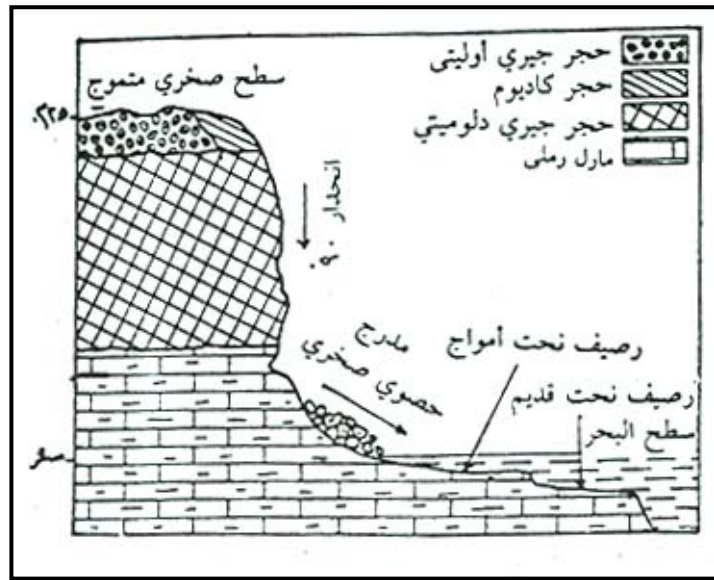


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:Shore Platforms

(84)

Recession

(85)

Bird

(86)

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Bird

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Tidal Platforms

Wave Cut Platform

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.(1992 Sunamura) A

(87)

Tidal Range

Inner

.(Ramp)

Wentworth

Edge

1978 Threnhiale

(85)

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(87)

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Semi Parallel Rills

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(1959 Tricart)

Salt Spray

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Bird

Low Tide

Tidal Range

.(p113 T Sunamura)

Fringing Reefs ()

Algae

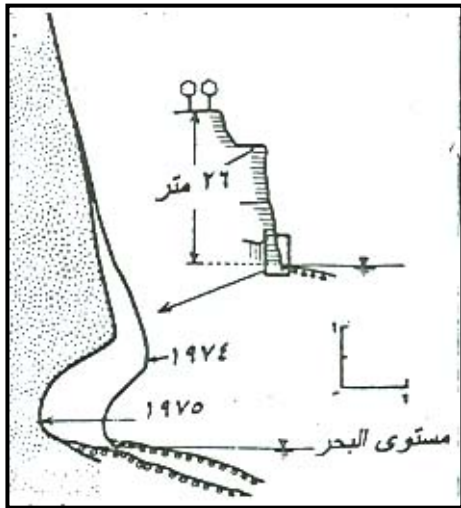
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:Wave Notches

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Laterally Extending Hollow

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(Higgins. 1980) A Nip

Wentorth

Visor

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Notche

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.Platform Junctions

Sunamura

:Sea Caves (

Penetration

Stratification

.(1958 Guilcher)

1981 Hutchinson

Holderness

Positive Feedback

– Process

.(p 185 T Sunamura)

Cylindrical

Tunnel

Scouring

Blowhole

.Oval Cross Section

Storm Surges

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(88)

:Sea Archs and stacks

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Headland

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Chimney Rocks or

Sea Stack

Coral Reef Barrier

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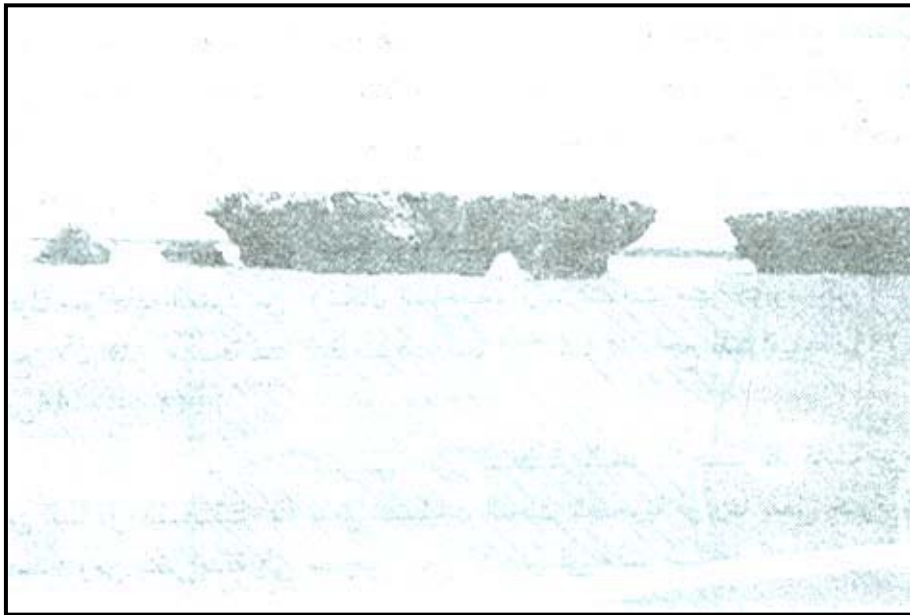
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False Bedding

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:Headlands and off shore Islands

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:Tompolo (

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Barren Joey

Sandy Isthmus

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Drumlins

Lagoon

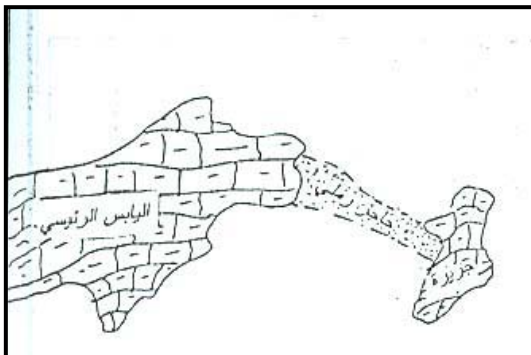


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:(*) Ramparts

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Ridges



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(1958 Wentorth)

1935 Bartrum

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– Sea Edge

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Edwards

Otuay

(1974 Gill)

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.Ferruginous Indurations

Ramparts

Suzuki

Furrows

Mudstone

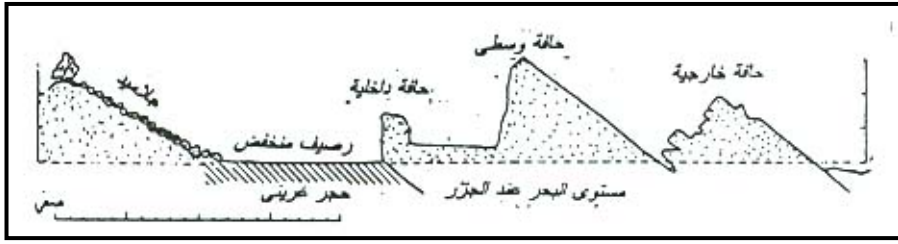
Tuff

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Bidirectional

Unidirectional

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:Ramps

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Seaward Dipping

Slopes

1977 Robinson Trenhaile 1978

" "

Ramps

Robinson

Ramps

Concave Ramps

:Pot holes

-

Grinding Action

Trenhaile)

.(p26 1987

- -

.(p199 T. Sunamura)

Abrasive

.Materials

:Solution Pools -

" "

Pans

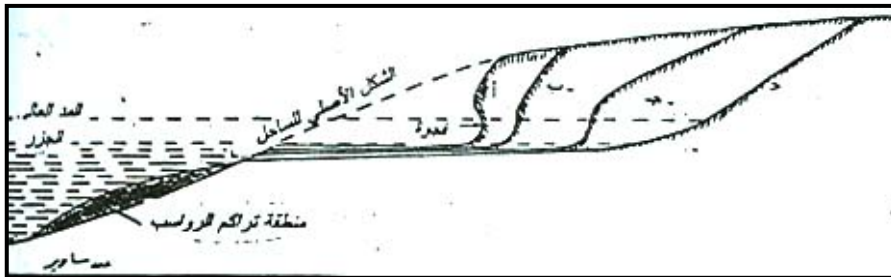
Emery)

Biochemical Process

(1946

Bedrock ()

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Initial Slope ()

Notch

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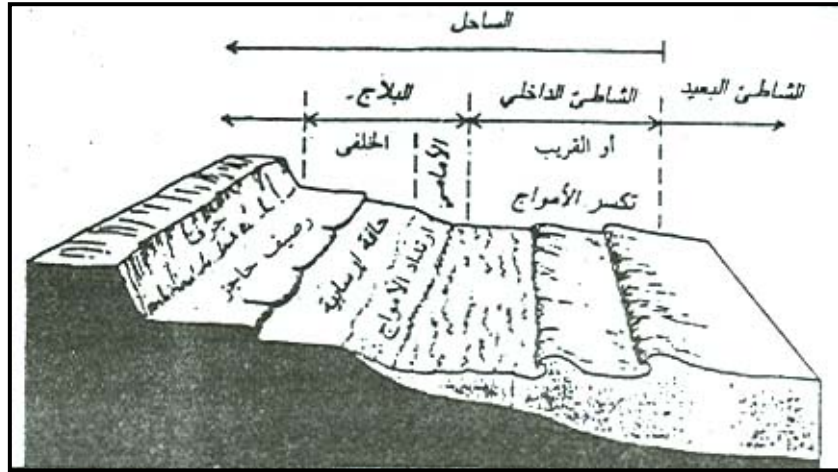
Deposition

Near Shore

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Coast

Shore

Back Shore

() Coast Line

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Fore Shore

Shore Line

Near Shore

Off Shore

:Beach (

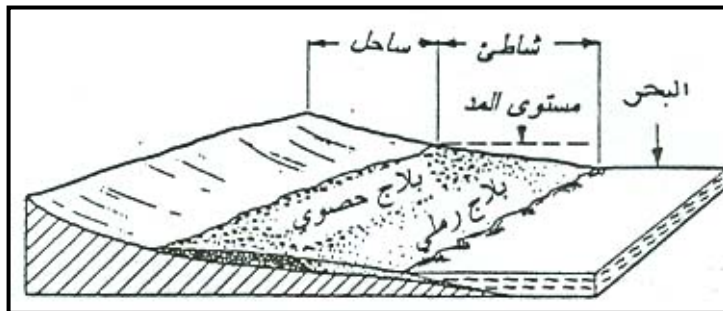
.Storm Waves

Gently Concave

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F. J Monkhouse)

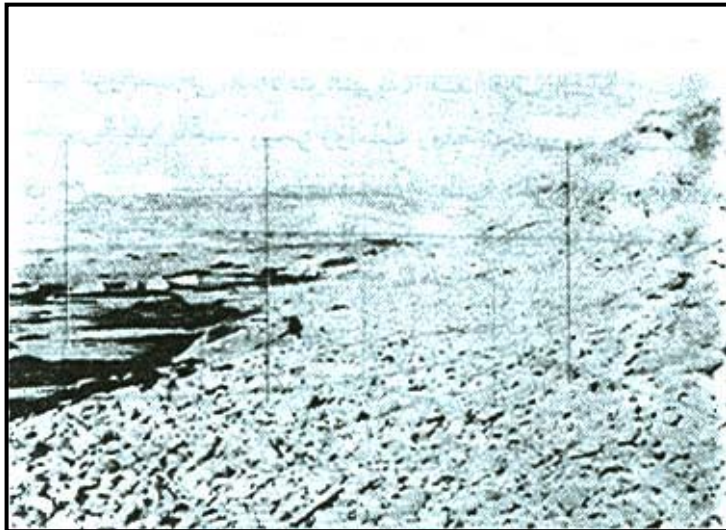
.(1970



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Jennings

Backwash



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Refraction of

Irregular Shore

the Wave – Crests

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M. 1976 Morisaw)

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(89)

Bars

Surf zone

() Back Wash

:Spits (

Hook

Littoral Currents

Littoral Drift

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(89)

Swash



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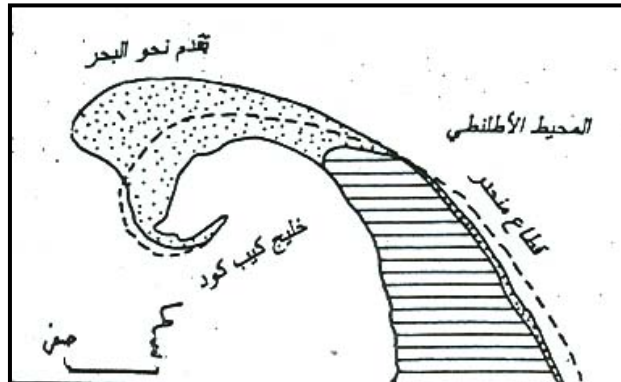
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Shingle Spits

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Recurred

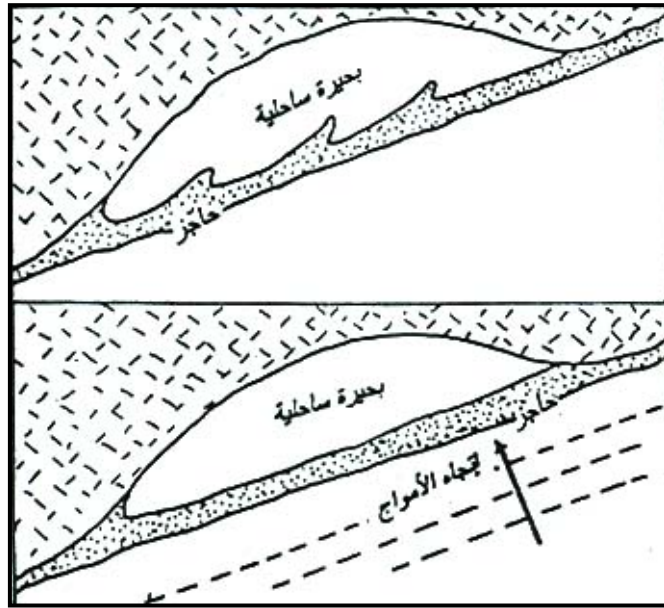
.(-)

:Barriers (

(p188 1978 E.c. Bird)

Berms
Bay Barriers

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Long

Shore current

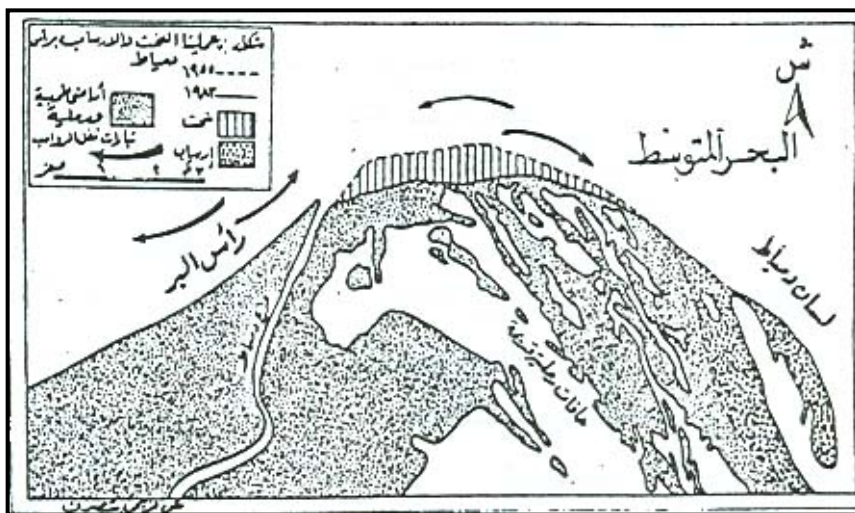
.(1953 J. A. Steers)

.Inlets

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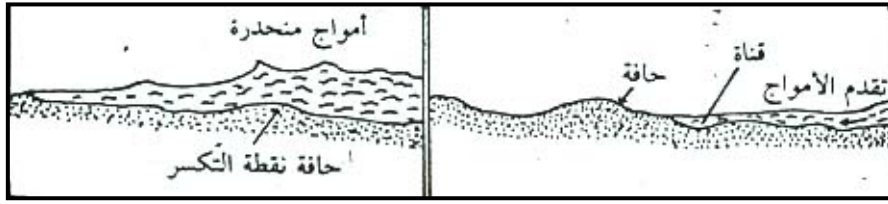
:Break Point Bars (

Break Point

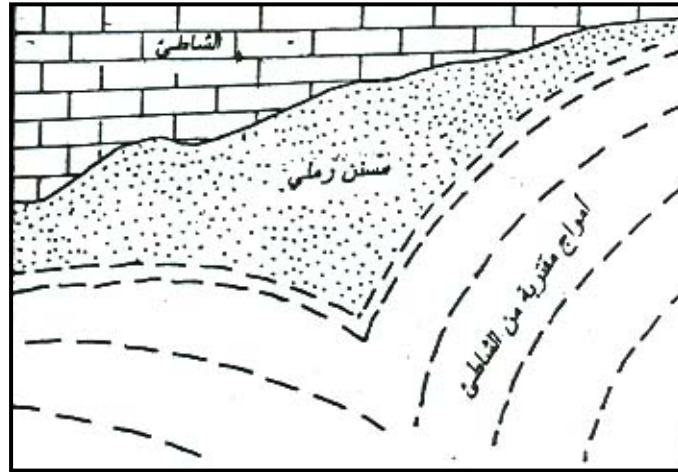
Back Wash

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1964 Thom

1953 Gresswell

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:Beach Cusps (

(1965 D. W Johnson)

Swash

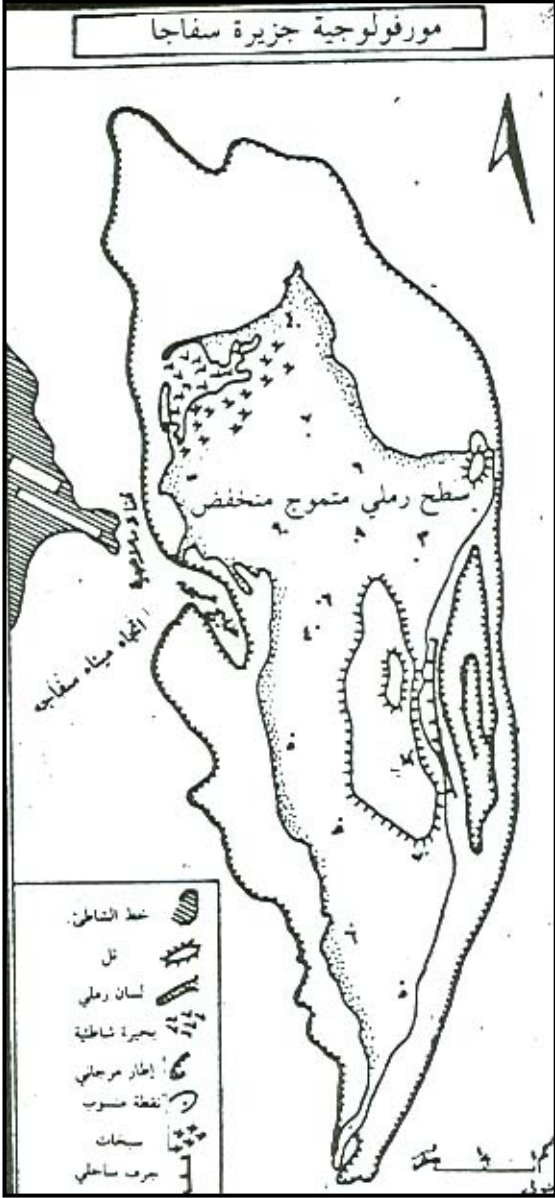
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Shoals

Cusate Spits

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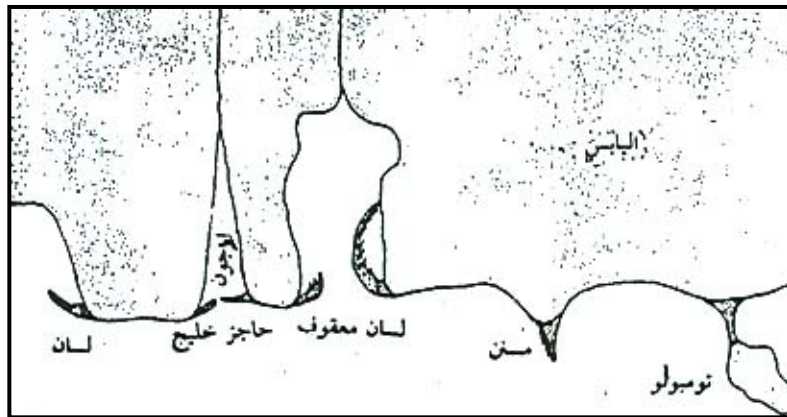
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Ria - Coast

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.Estuary

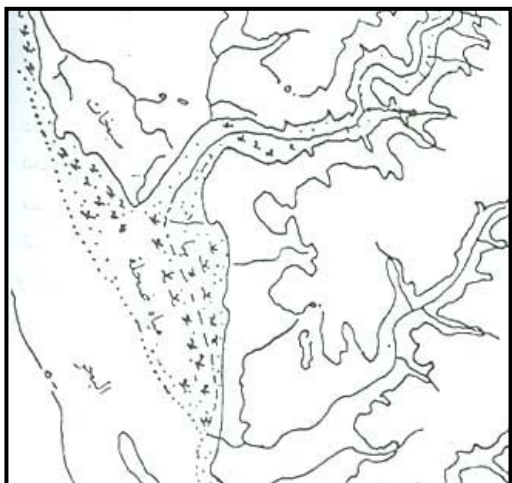


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Troughs

Funnel Shaped

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High Tidal Flats

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:Coastal lagoons

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Brackish

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On Shore Wind

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Salt Flats

Glennie

Evaporates

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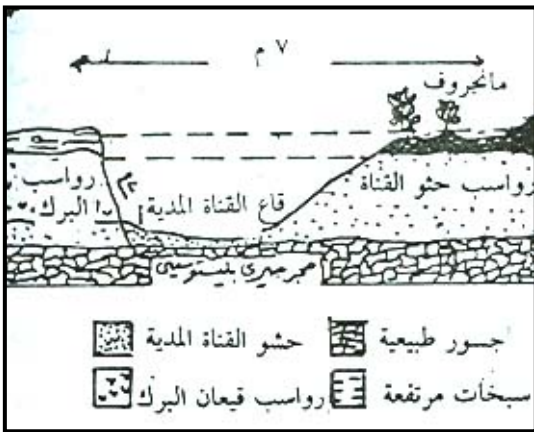
Mud Banks

:Tidal Creeks

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Natural Levees

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(p65 J. L. Davies)

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:Salt Pans

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:Minor Gorges

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Fissures

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Beach

Ridges

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:Mangrov Swamps

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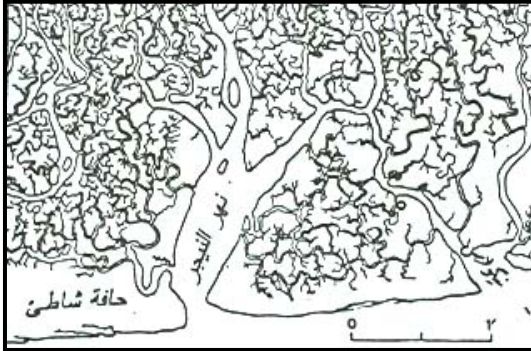
Mud Banks

Reticulated

Tidal Estuaries

Creeks

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Inlets

Convex Slopes

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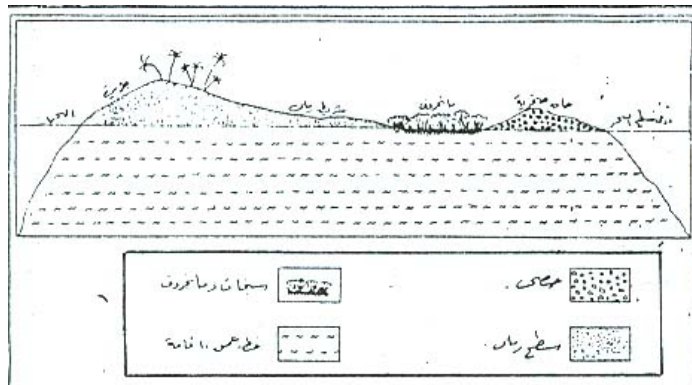
27 -

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Ridges of Coral Shingle

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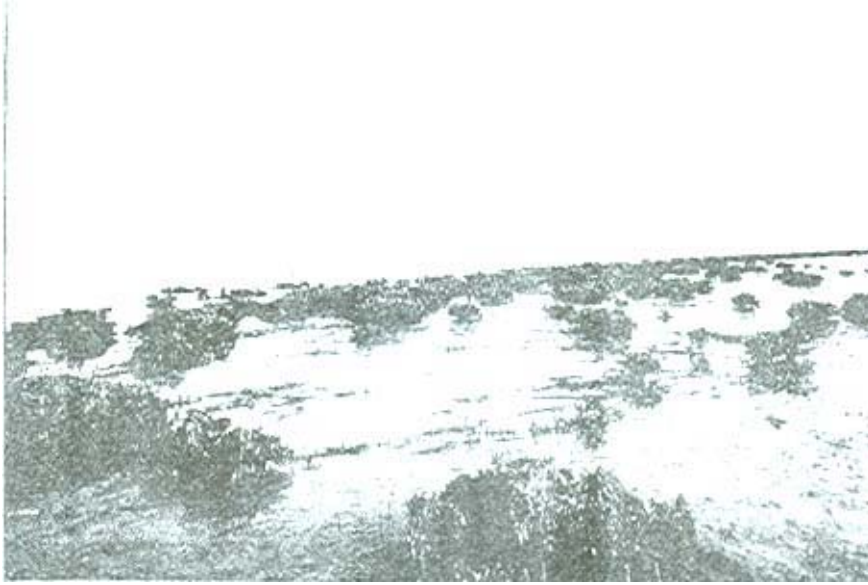
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:Coastal Sand Dunes

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Cooper

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:Humidity -

1949 Belly

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Shear Strength

Dampness

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1954 Smith

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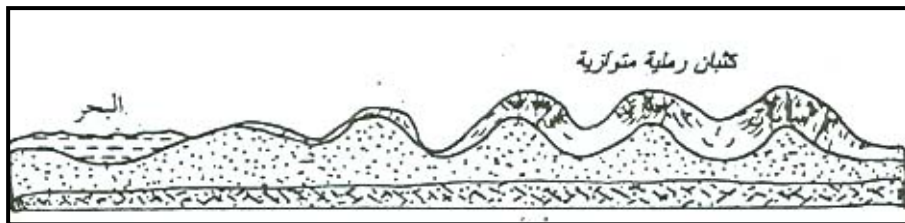
(Davies, J. L., p152)

(91)

Primary Impeded

Frontal Dunes

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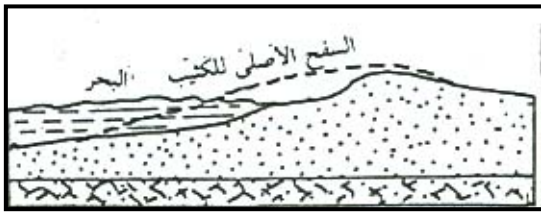
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Amphora Are aria

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:Secondary Dunes (

:Parabolic Dunes -



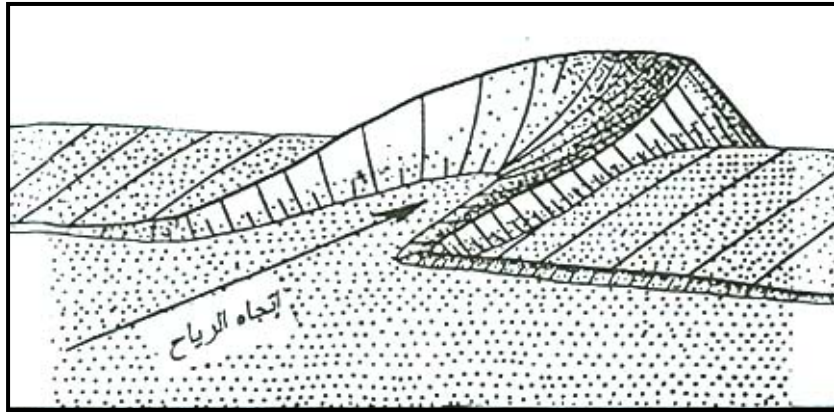
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Overgrazing

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Pyramidal Shaped

Sand Trapping

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.Lee Wind

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:Litchfield Dunes -

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Videos

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Coral Reef Coasts

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Skeletal Structures

Malusscus ()

Shely Organisms

Massive Reef

Organic Deposition

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:Salinity -

Dilution

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(p192 E. C. Bird)

:Substratum -

Up Welling

:Sedimentation -

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.(p68 J. L. Davies)

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1978 Davies

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Darwin

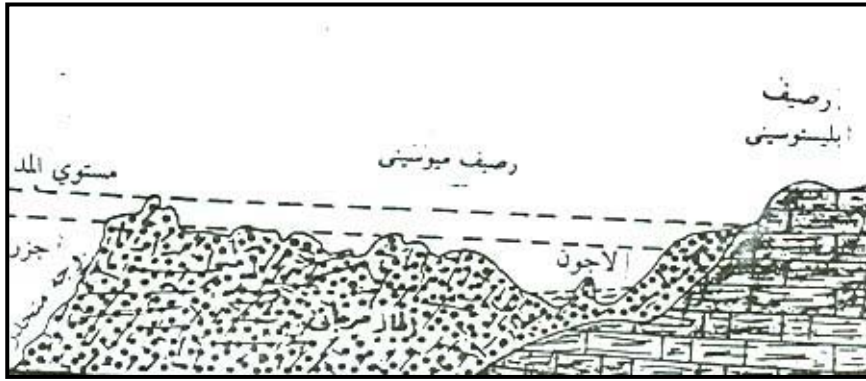
:Fringing Reefs

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(p560 1969 W. D. Thornbury)

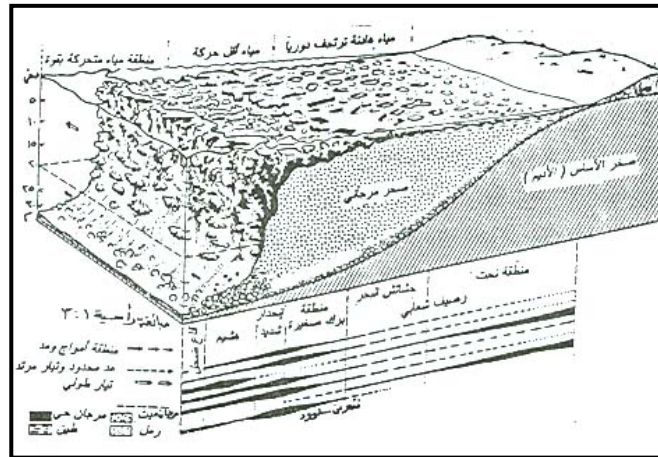
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Abrasion

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(1978 B. W Sellwood)

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:Coral Reef Barrier

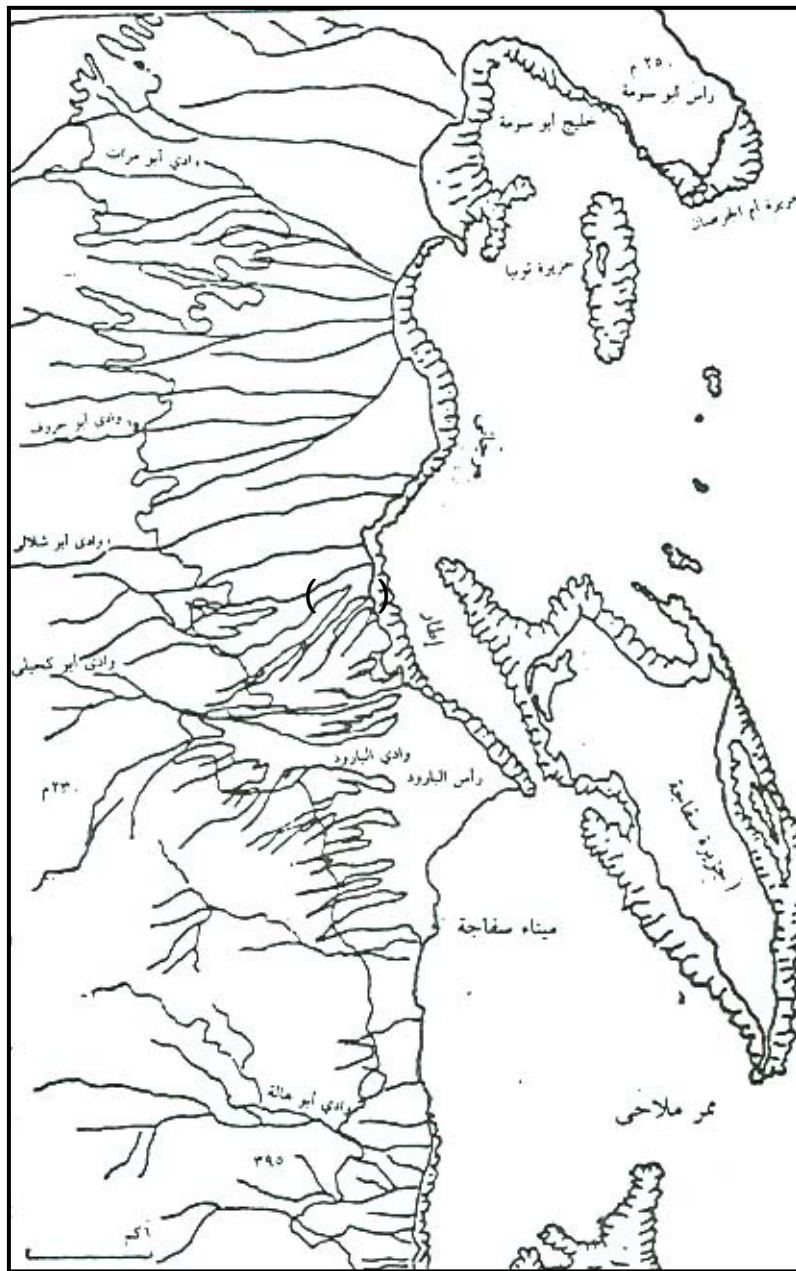
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K. W. Butzer)

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(p237 1976

Lateral Growth



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(p25 1970 R. C. Sharma)

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:Boulder Belt

:Reef Flat

:Atolls (

Horse Show Shape

.(P 710 J. L Davies)

(1958 Cloud)

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(1950 Fairbridge)

:Oceanic Atolls

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(92)

:shelf Atolls

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Scott

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Reef Patches

:Compound Atolls

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Crystals of Snow

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(93)

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Glacial Covers

Snow Line

Moderate Slopes

Steeper Slopes

Avalanches

Firm (Neve)

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- Serrated Ridges ()
(Abrasion)

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.Cirques

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(93)

() Glacier

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Inter Glacial Periods

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Gregory

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Glaciations

Plucking

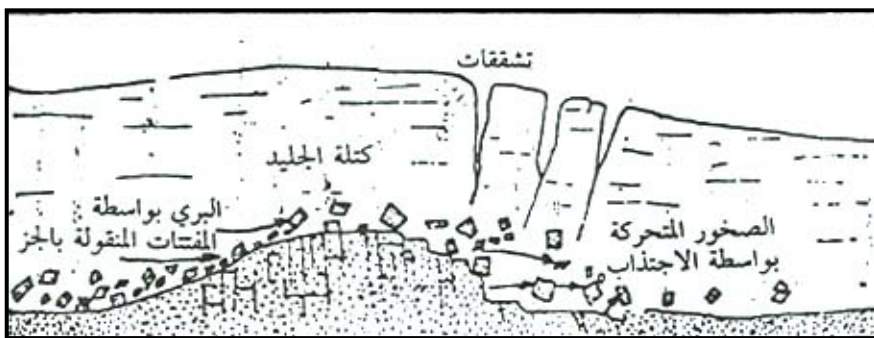
(96)

.Attrition

Traction

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Suspension



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Glaciers

Cirques

Hanging Valley

Arête or Serrated Ridges

Fjords

Ruches mouton's

:Glacier

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(96)

Scouring

Glaciology

Neve

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Concave

Snouts ()

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Aletsch

Monch
Concordia platz

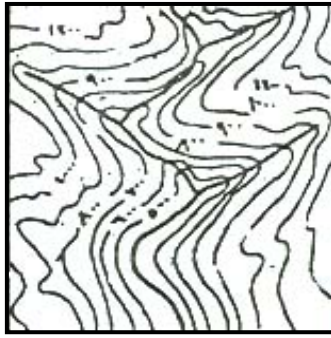
Jungfrau

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Pyramidal Peaks



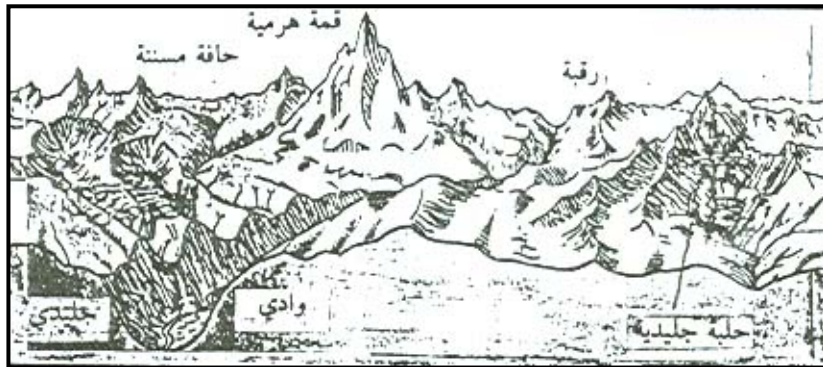
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Crevices

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Ice Fall

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:Piedmont glaciers

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Coalescing Glaciers

Malaspina

:Hanging Valleys (

Ice Fall ()

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:Cirques (



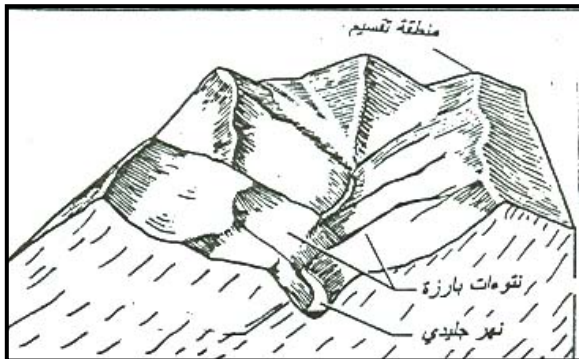
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:Serrated ridges

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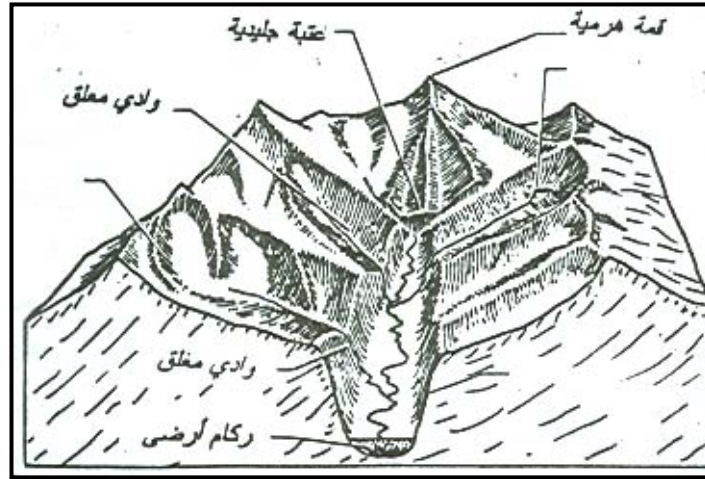
Corrie

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Pyramidal Pear



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:Threshold

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Ice Fall

W. V Lewis

:Rock Basin

Neve

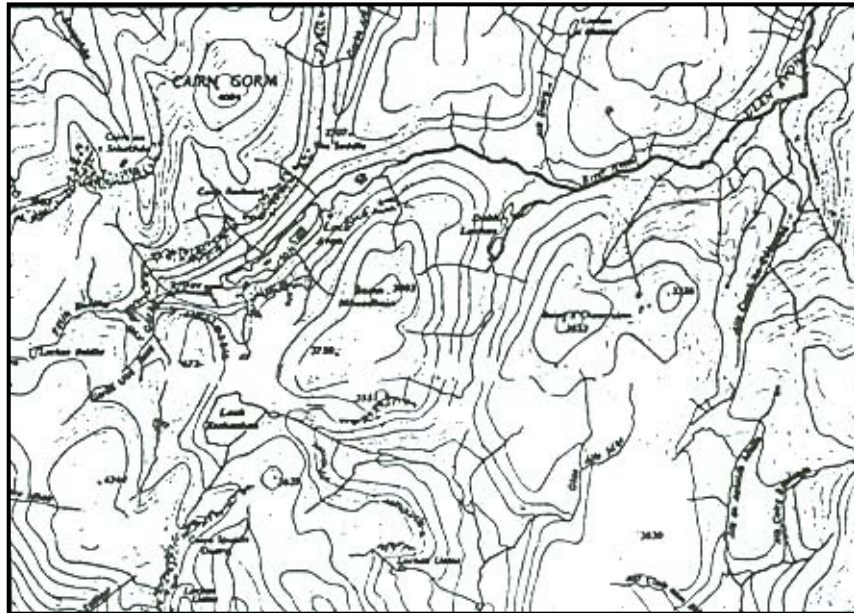
Glin Avon

Ribbon Lakes

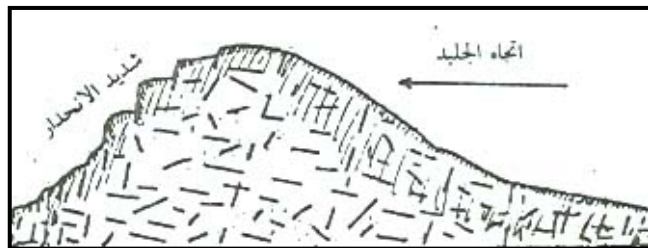
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:Roche Moutonnes () -

Serialized

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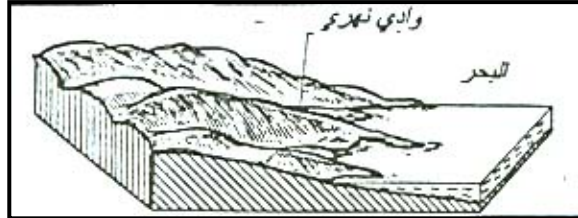


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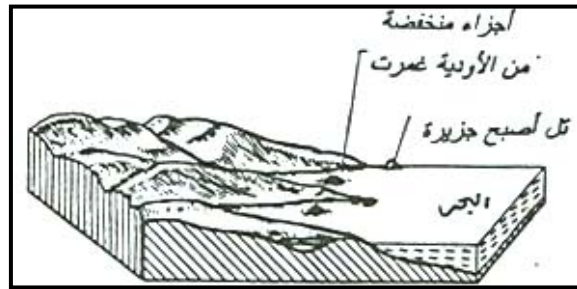
:Fiords -

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Easterlies

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Terminal Moraine

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Till Plain

Ground Moraine

Drumlins ()

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Circular

Erratic Rocks

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Lateral Moraine

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Medial Moraine

Kames

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Eskers

Glacis Fluvial

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:Glacial Moraines

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:Lateral Moraines

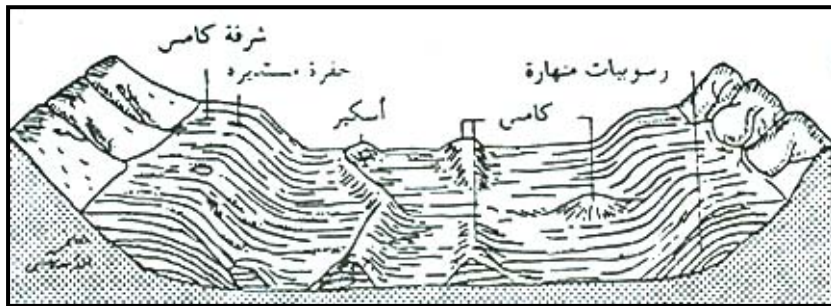
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Avalanches

:Medial Moraine

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:Terminal Moraine

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Recessional Moraines

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Glaciological Deposition :

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:Kames (

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Kames Deltas

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:Eskers (

Narrow

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Ridge

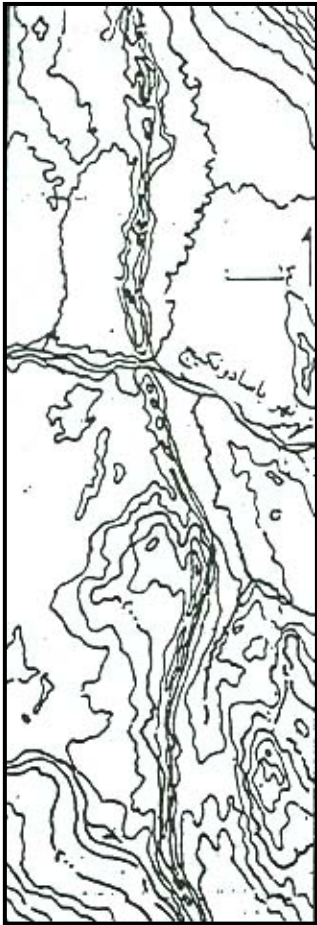
Bed

Rolling

Load

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:Erratic Blocks (

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L Agaceiz

:^(*) Drumlins (

Basket of Eggs Relief

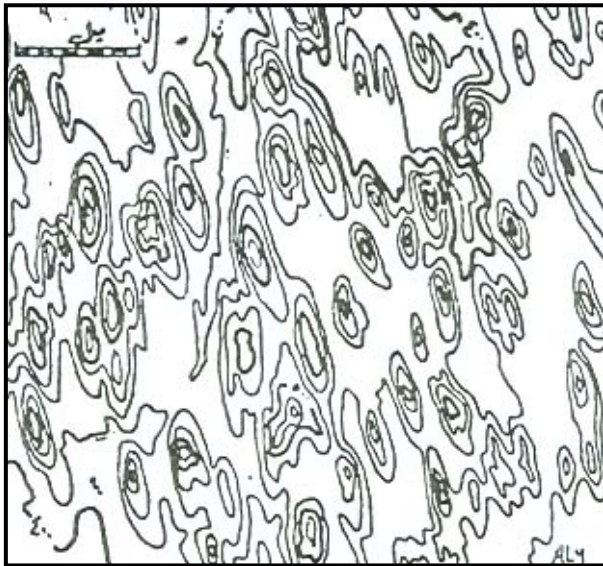
.Ground Moraines

(Eden Valley)

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:Till Deposits () (

.Tillite ()



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Perennially Frozen Zone

Karyolitic Zone

perms Frost

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sol fluxion

Terraces of Altiplanation

Block Train

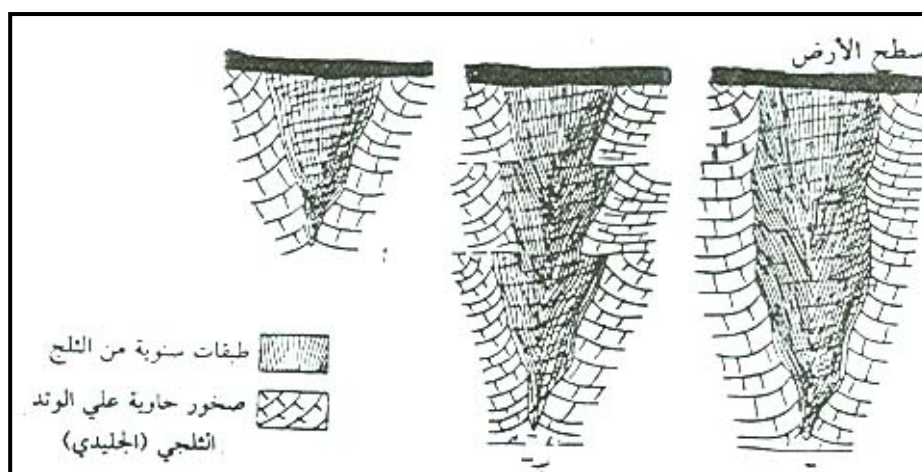
Stone Ribbons

Fissure Frost Polygons

.Poly Gonalstructure

Ice Wedge

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المراجع

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