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**Sedimentary structures as indicator of natural processes and human activity. Tel el Farcha aechaological site. Nile Delta. Egypt**

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The aim of the publication is presentation of various sedimentary structures mixed with traces of human activity. Proposed examples are presented as photos and sequence of drawings showing stages of phenomenon. Moreover is included explanation of sequence of sedimentation and destruction of described profiles.

Proposed publication is offered as example of interpretation of geo-archaeological profiles and may help understand the sequence of occupation, destruction, sedimentation and general understanding of phenomenon at other archeological sites. Examples represent selected profiles showing natural processes as well as human activity.

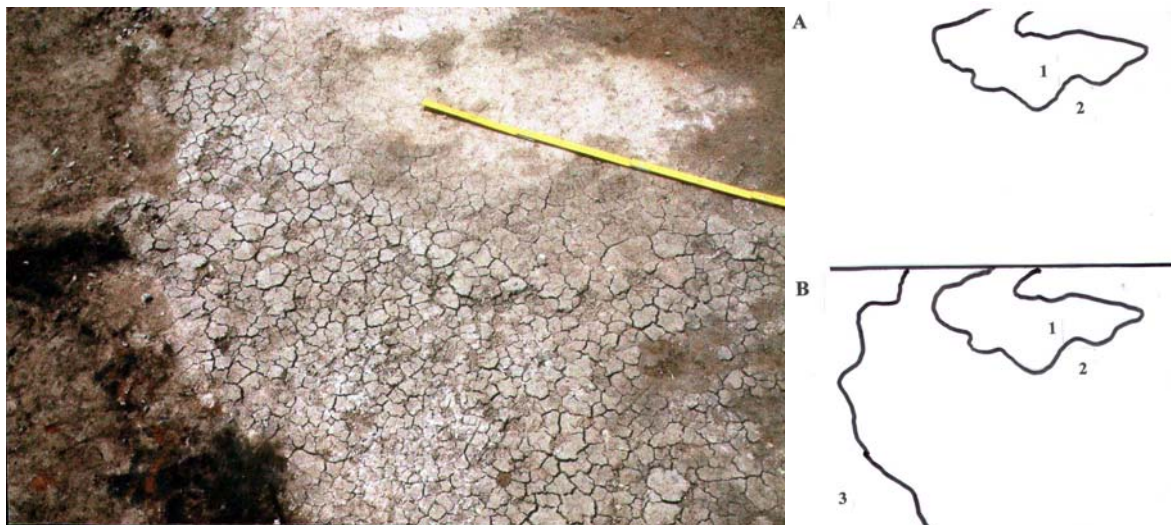


Photo 1 Natural processes. Traces flood of Nile. Sedimentation of Nile silts on sand of gezira. Layers present at the bottom of the trench W.

A – 1 – top sands of gezira, 2- thin layer of gray Nile silts over sands of gezira.  
B – 3 oldest archeological layer overlaying Nile silt containing fine grains of charcoal.

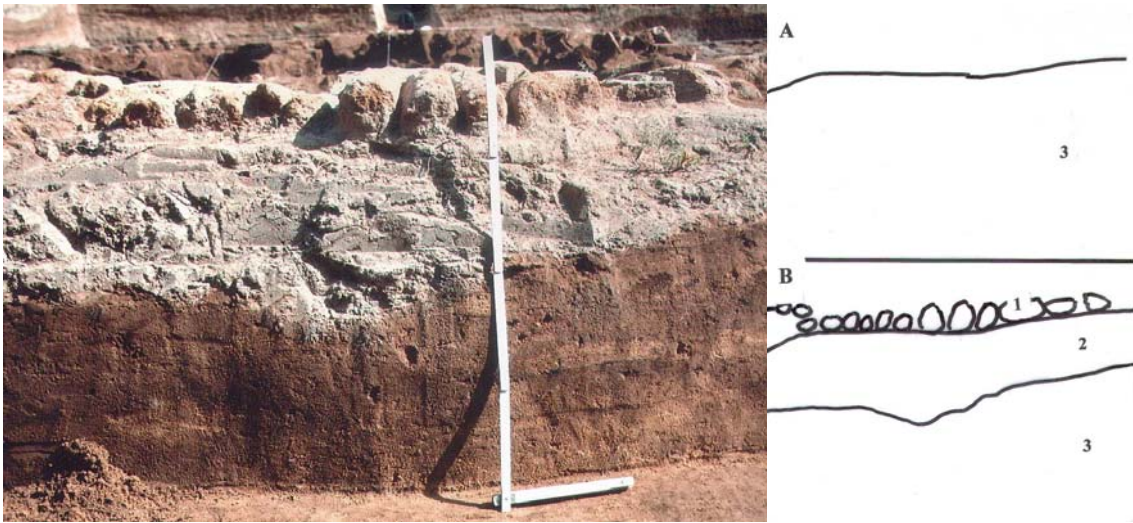


Photo 2 Human activity on sands of Gezira. The structures under the brewery. Bottom of trench W , wall E.

A – 3- primary, yellowish, top sands of gezira. B – 3 – sands of gezira enriched with iron oxides (brown – reddish) removed down by Man from sediments present just under the bricks of brewery. 2 – white sands free of iron oxides washed (out down by organic acids as relicts of organic substance used in brewery for beer production). 1 - cylindrical bricks of brewery construction.

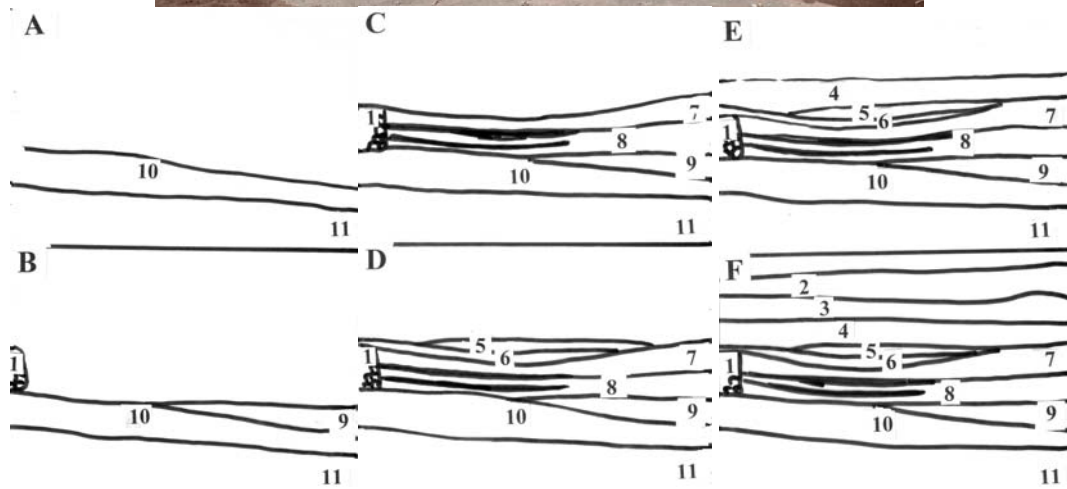


Photo. 3 Processes of sedimentation. Traces of Nile flood – layer no 9. Trench W, wall N.

A- 11 – Nile silt covering sands of gezira (document of high level of Nile), 10 – anthropogenic sediments (results of destruction of brewery?). B - 9- Nile silt – document of high level of river (flood), 1 - brick wall. C-F – 8 - 2 younger anthropogenic layers of various origin.

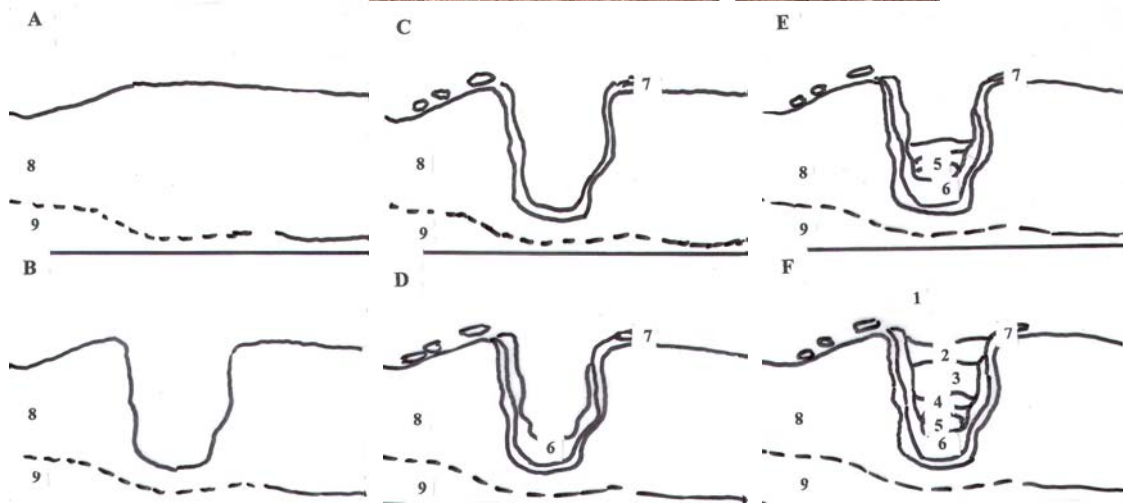
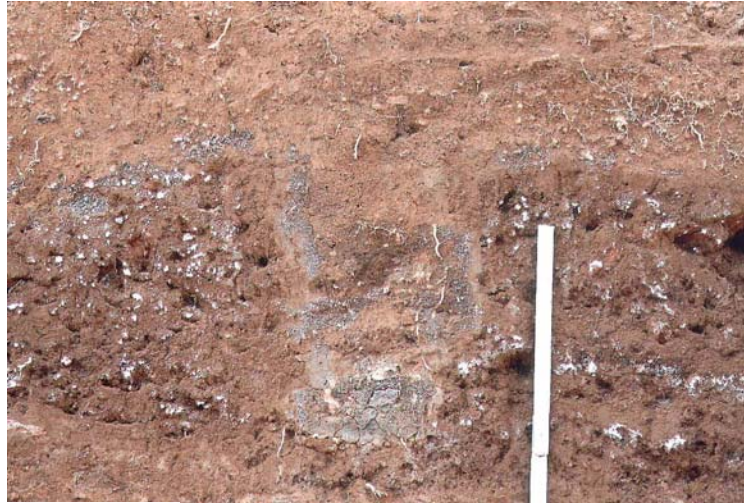


Photo 4 Human activity – small canal. Walls coated with Nile silt. Trench W, wall S.

- A- 9, 8 - deposition of anthropogenic sediments. B- phase of preparation of hole, C – 7 - phase of deposition of
- B- gray Nile silt (high level of Nile). D – 6 - phase of filling up of the hole with gray Nile sediments
- C- re-deposited from the layer no 7. E – 5 deposition of anthropogenic material. F – 4, 3, 2,
- D- 1 – the sequence of anthropogenic deposits filling up the hole.

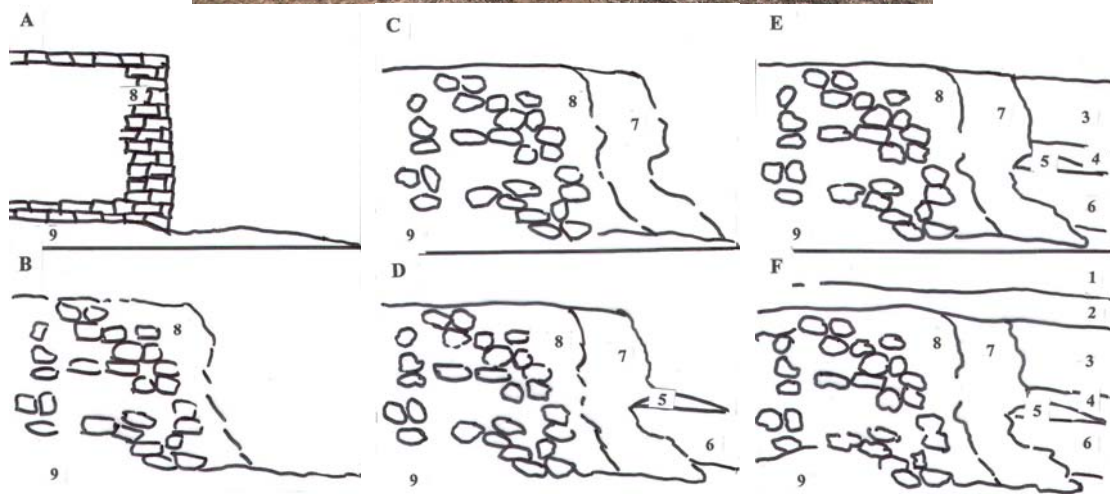


Photo 5 Human activity and processes of brick destruction with water. Trench W, wall S.

A – construction of wall ( 8) of drayed bricks over anthropogenic sediments no. 9. B - Collapse of the wall due to underground penetration of water - bricks at the base are deformed due to changes of the volume of wet clay minerals (high level of Nile) as well as deformation of wall due to rains ( destruction of bricks near of the external surface of wall. C – 7 - next phase of rain destruction of wall. D – 6, 5 – deposition of sediments around the wall, E - 4, 3- next phase of sedimentation of anthropogenic sediments around the wall. F- 2, 1 – covering of destroyed wall with younger anthropogenic sediments.

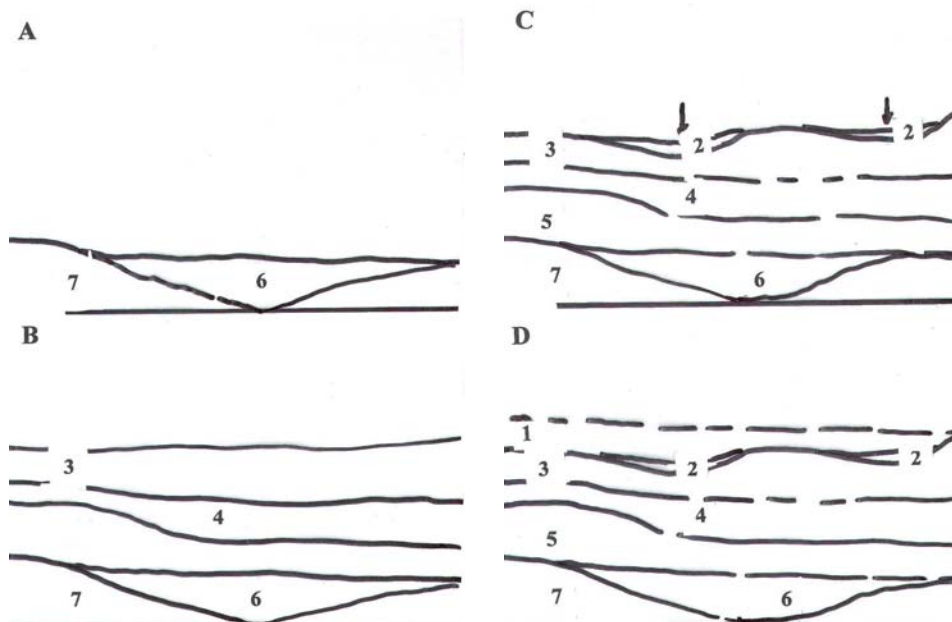


Photo 6 Human activity and natural sedimentation. Trench C, wall N.

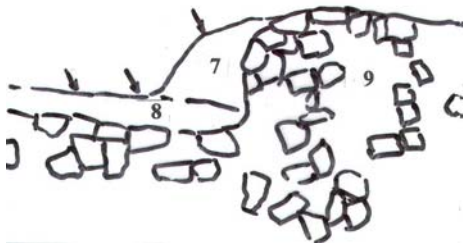
A- 7 - deposition of anthropogenic layer. 6 -and filling up of small depression.  
 B – 5, 4, 3 – sedimentation of sequence of anthropogenic layers (eolian and human activity).  
 C - 2 - location and functioning of two small fireplaces . Right fireplace is slightly older because sediments of left fireplace are slightly overlaying margin of right fireplace. (see photo). Surface of sediments filling up the fireplaces is cut by eolian erosion ( see photo – delicate light line).  
 D – 1 – younger anthropogenic sediments.



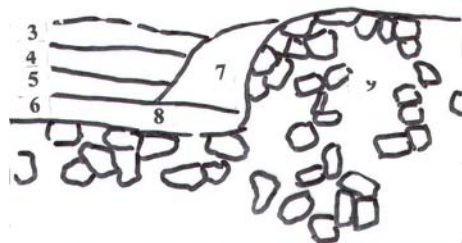
A



B



C



D



Photo 7 The processes of destruction of brick wall -collapse. Trench W, wall S.

A – 9 - architectural object build of drayed bricks. B – collapse of objects due to sorption of drayed bricks of water from the ground (higher level of underground waters – higher Nile ? Higher rate of rains ?). Washing out of the mineral material from the wall by rains and deposition of sediments no 8 and 7 ( arrows). C – deposition of sequence of anthropogenic layers no 6, 5, 4, 3. D - complete cover of the collapse wall with younger anthropogenic sediments no 2 and 1.

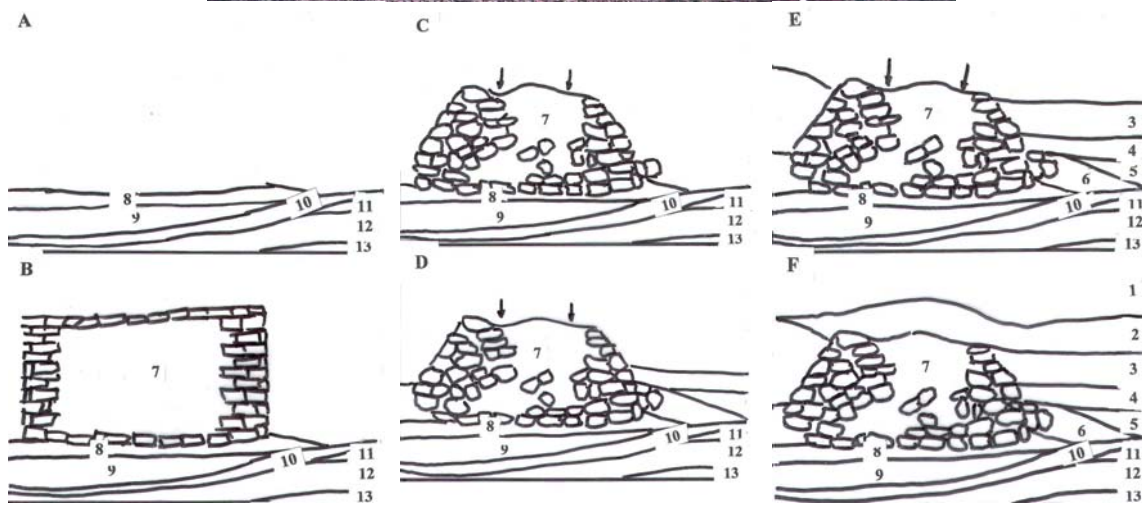


Photo 8 Stages of destruction of brick wall by rains and wind. Trench W. wall E.

A – deposition of anthropogenic layers no 13, 12, 11 intercalated with Nile silt – layer no 10 (high Nile) and covered with anthropogenic sediments no 9 and 8. B - 7 - construction of thick wall of drayed bricks (pure Nile silt used – no admixture of grass, straw or sand). C – Phase of destruction of the wall due to rains (arrows) . Drayed bricks at the top of all lost shape, while at the base of wall are still geometric. D – 6, 5, 4 - deposition of anthropogenic sediments around destroyed wall. Continuation of destruction of the top of wall by rains (arrows). E – 3 deposition of next younger generation of anthropogenic sediments. Continuation of destruction of the top of the wall. F – phase of end of wall destruction and covering of wall with youngest anthropogenic sediments no 2 and 1.



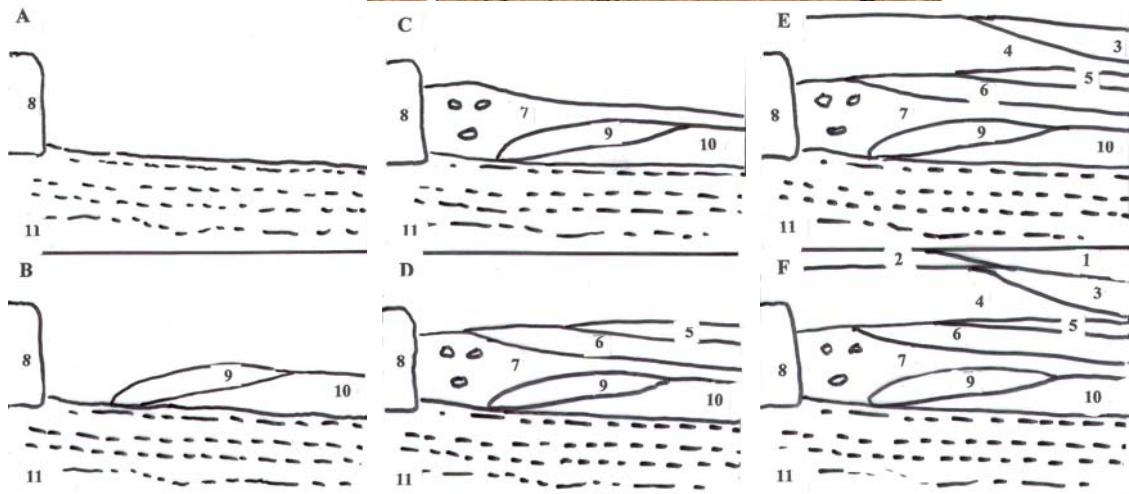


Photo 9 The stages of sedimentation. Trench W, wall S.

A, B - 11 - anthropogenic sediments with traces features formed due to rains ( see photo - thin lines formed by minerals cementing surface after rain), 10, 9 – rubbish containing small fragments of pottery, and organic matter secondary mineralized by light calcite. 8 – wall made of drayed bricks ( separate bricks are not seen due to secondary processes i.e. swelling of clay minerals due to moisture of sediments). C – 7 - anthropogenic sediments ( rubbish) with coarse fragments of pottery throw out the wall and latter washed out. D – 6, 5 – sequence of sediments. The upper surface of sediments cut by erosion. E – 4 – anthropogenic sediment eroded at right part. Place of erosion filled up with anthropogenic layer no 3. F – 2, 1- situation repeated as at scheme E. Sediment of layer no 2 cut by erosion. Formed shallow depression filled up next with sediment no 1.

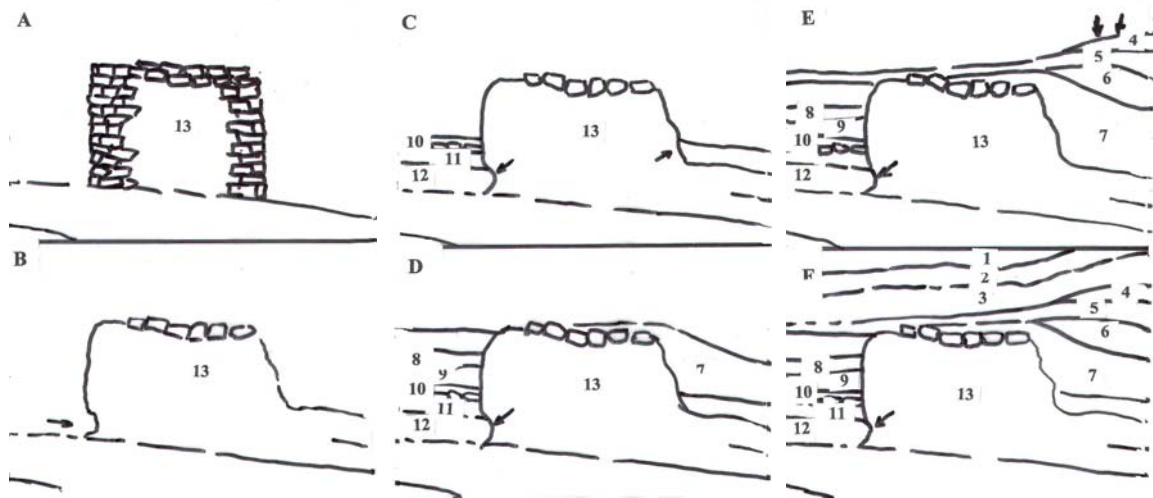


Photo 10 Destruction of architectonic objects. Trench W, wall S.

A -13 - phase of construction of object build of drayed bricks. B - phase of collapse of wall ( disappearance of shape of bricks). The presence of well preserved bricks at the top of wall documents absence of rains.

Arrow shows place of destruction washing away of the base of the wall by water (high Nile). C - layers 12, 11, 10 deposition of anthropogenic sediments around of destroyed wall. D - phase of sedimentation of next generation of sediments no 9, 8, 7. E - Deposition of layers no 6, 5, 4 and erosion of layers 5 and 4 (arrows). F - deposition of youngest rewashed anthropogenic sediments no 3, 2 and 1.

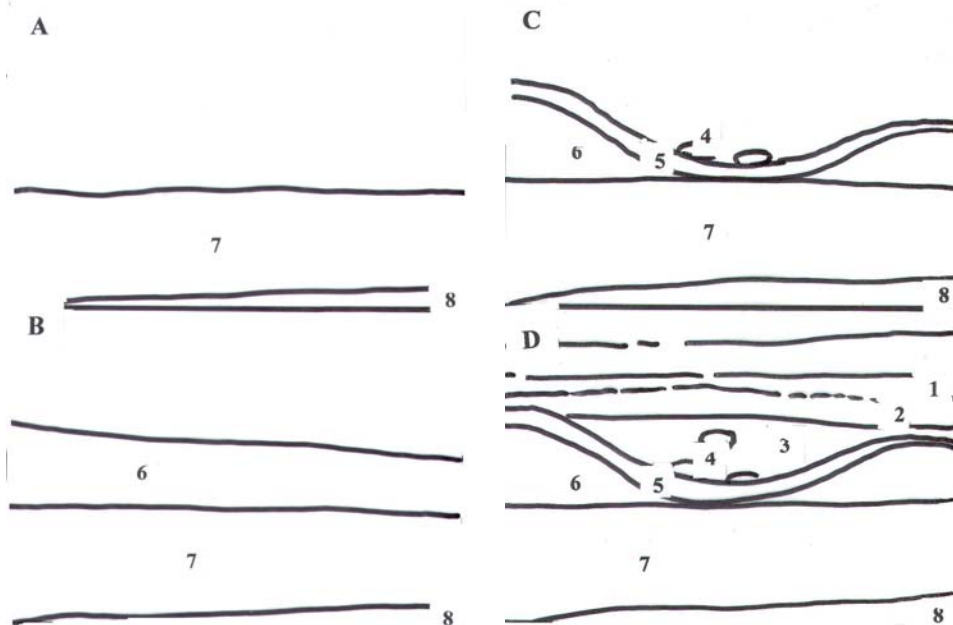


Photo 11 Human activity and processes of eolian destruction of fireplace. Trench C, wall W.

A – 8, 7 – mixed anthropogenic layers, B - 6 - layer containing relatively coarse fragments of pottery. C – phase of formation and use of fireplaces . 5 – burned silt under fireplace, 4 – small stones and other filling up the fireplace. D – phase of natural filling up of fireplace by sediments no 3. 2, 1 - younger layers of reddish color containing higher amount of powdered reddish burned silt.

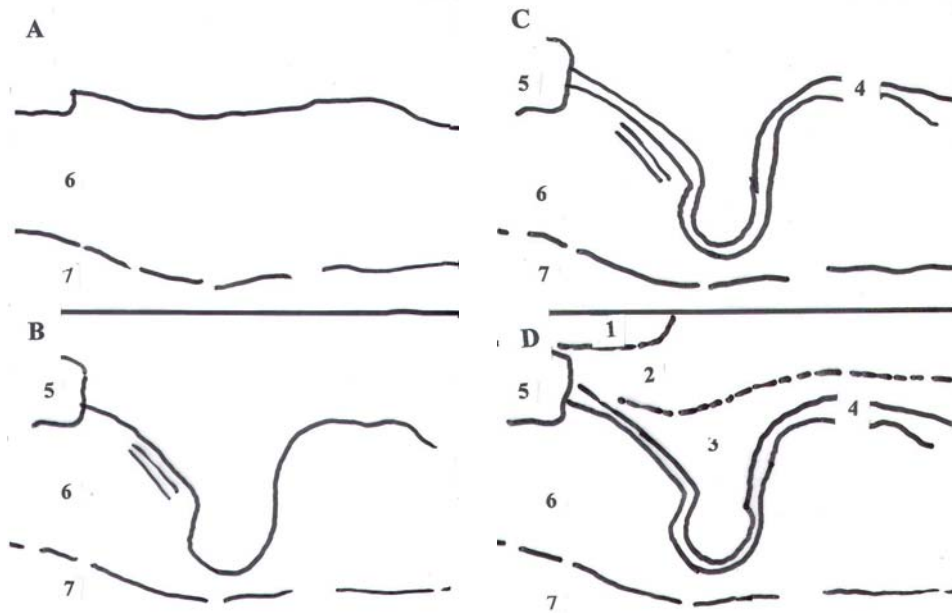


Photo 12 Human activity – small canal. Trench W, wall S.

A - 6, 7 – anthropogenic layers containing admixture of small fragments of burned clay, charcoal, etc. B - 5 – construction of clayey floor and small canal. C- 4 - high level of Nile and deposition of thin not continuous layer gray silt. D – 3, 2, 1 - phase of filling up of small canal with anthropogenic sediments.

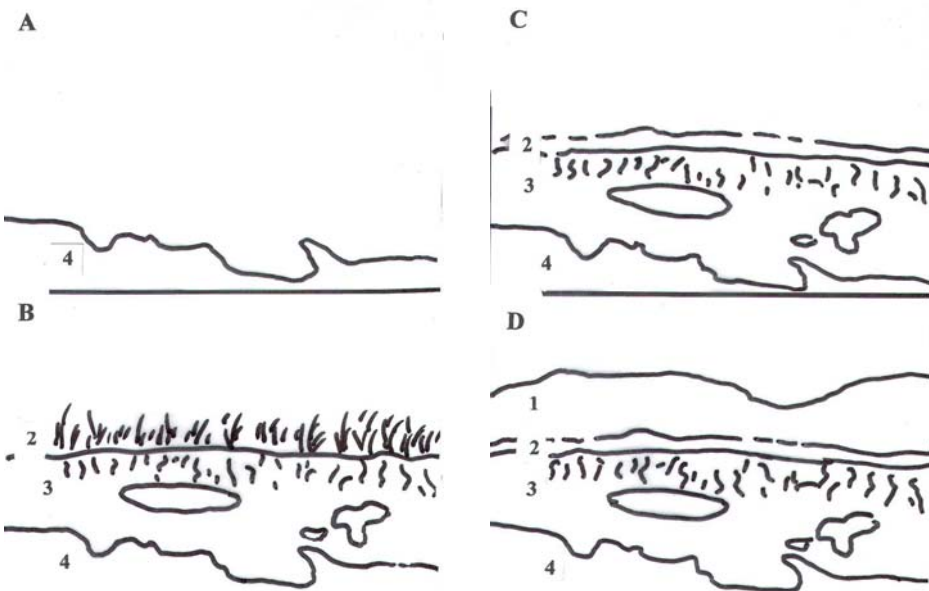


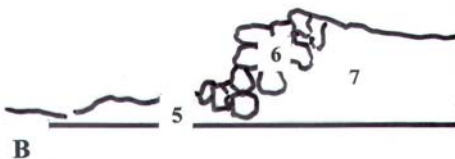
Photo 13 Traces of old soil horizon and ruts of grass. Trench W, wall N.

A - 4 - deposition of anthropogenic layer containing burned, powdered reddish silt. Destruction of top part of layer by sedimentary phenomenon. B- 3 – deposition of diversified material of anthropogenic origin (powdered silts, small fragments of pottery powdered, charcoal, etc. 2 - horizon of traces off grass – document of presence of natural surface not occupied by man. C – 2 – relicts of soil. D – 1- youngest anthropogenic silts containing various mixed material (fragments of burned clay, fragments of pottery, charcoal, etc.)

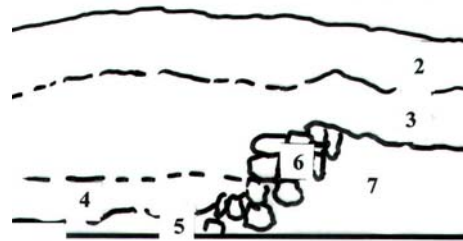


A

C



B



D



Photo 14 Natural processes of destruction and sedimentation. Modern ruts of halfa. Trench W, wall N.

A - 7 - anthropogenic sediments, 6 - small wall build of drayed bricks destroyed naturally by rains, 5 - rewashed rests of wall (6). B- 4 - deposit (gray) of next rewashed rests of wall . C - 4, 3 - anthropogenic layers containing burned clay, fragments of pottery and other, 2 - next anthropogenic layer (slightly reddish) containing burned clay etc. D - 1 - modern deposits. Layers 1 and 2 overgrow by ruts of grass and bush.

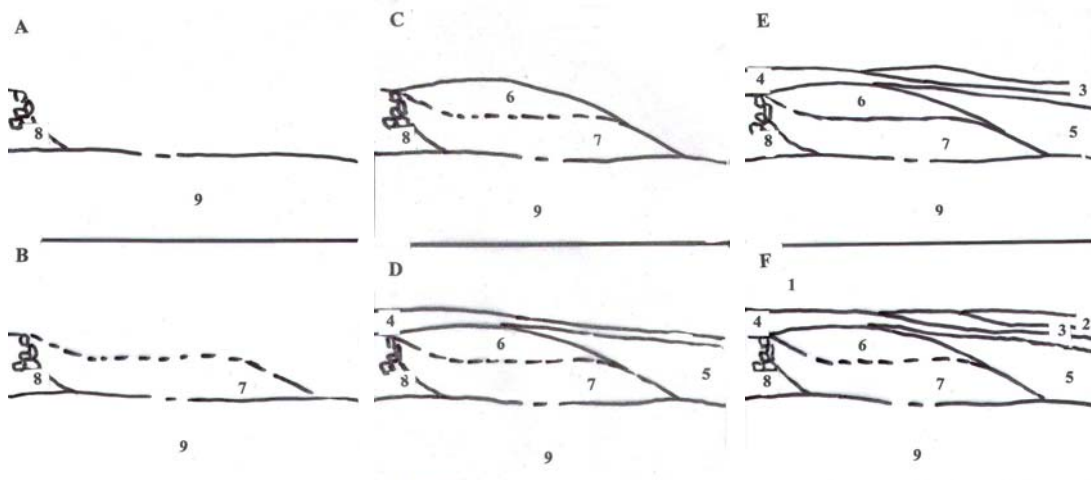


Photo 15 The relicts of human activity. Rubbish with charcoal (layer no5) mineralized with light calcite .  
Trench W, wall W.

A - 9 – anthropogenic sediments, 8 small wall build of drayed silty bricks, B – 7 – older rubbish throw out the wall (organic matter mineralized by secondary crystallized white carbonates), D - 6 – younger rubbish, D -5 – anthropogenic sediments covering rubbish, 4 – younger generation of anthropogenic sediment. E – 3- grayish sediment with admixture of powdered charcoal. F – 2, 1 – sequence of younger anthropogenic sediments containing micro grains of burned silt, fragments of pottery, etc.

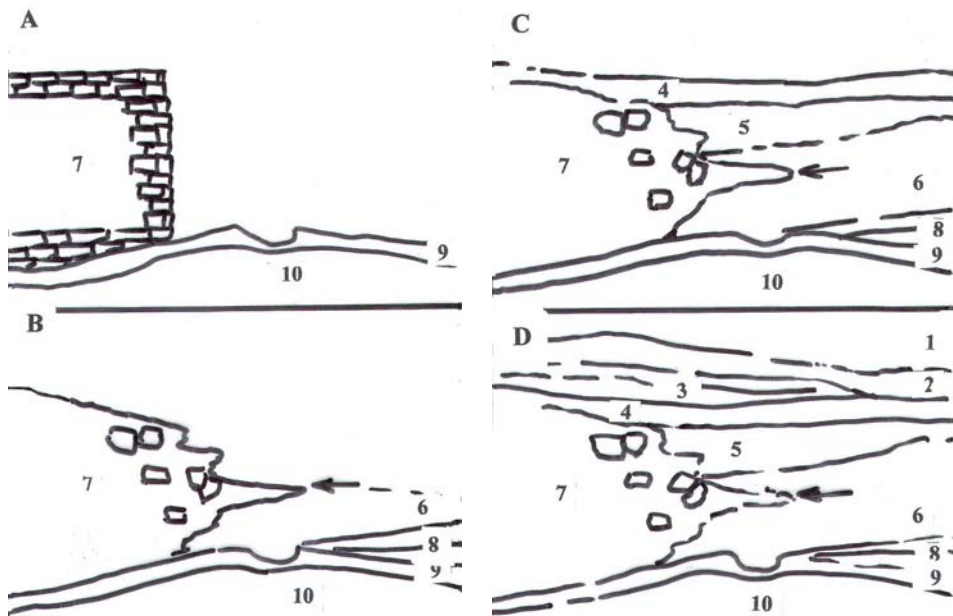


Photo 16 Construction and destruction of architectural object. Trench W, wall S

A – 7 - construction of object using drayed bricks over anthropogenic sediments no 10 and 9. B – complete destruction of the wall by high water of Nile. The drayed bricks lost the shape due to swelling of clay minerals present in silt used for brick production. The wall starts to be a homogenous mass with single deformed bricks. At the same time take place the deposition of gray silts layers (no 8 and 6) The arrow shows erosive structure formed due to wave activity of high Nile. C - deposition of layers no 5 and 4 constituting the mixture of destroyed wall, natural Nile sediments and admixture of small amount of anthropogenic micro-objects (burned clay, charcoal, etc.) at secondary position. D - phase of covering of destroyed wall with younger sediments no 3, 2 and 1.



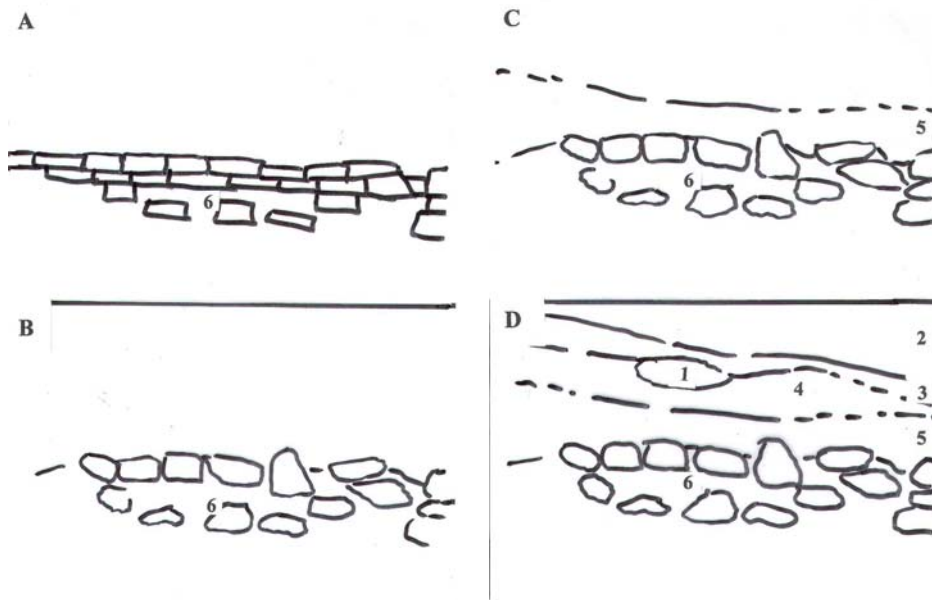


Photo 17 The processes of destruction of brick' s. pavement Trench W, wall S.

A - phase of preparation of cover with drayed bricks (floor of house? ), B – processes of deformation of floor due to changes of volume of wet clay minerals (swelling) present in bricks. C –next phase of floor deformation and overlaying of deformed brocks with sediments containing micro artefacts (charcoal, burned clay, fragments of pottery etc.) – layers no 5, 4, 3, 2. D - animal destruction of sediments (the hole w\filled up with young sediments).

## Conclusion

Described structures document the sequence of phenomenon helpful for reconstruction of climate as well as human activity. Identification as well as interpretation of structures is mostly difficult because of very similar character

of natural Nile sediments and sediments deposited as effect of human activity. The most important indicators helpful distinguish mentioned layers there is sediment color. Natural Nile sits are grey while anthropogenic layers are reddish because of admixture of burned clay, fragments of damaged pottery etc. Additional indicator of natural or human origin of layers there are microartefacts one can identified under the microscope. They are small fragments of charcoal, bones, pottery etc.

Presented studies conducted at Tel el Farcha archaeological site document complex history of the site but help correlate phases of site occupation at various parts of Gezira.