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A NEW CONCEPT FOR THE ORIGIN OF ACUMMULATED CONGLOMERATE, PRECIOUSLY KNOWN AS QULQULA CONGLOMERATE FORMATION AT AVROMAN-HALABJA AREA, NE-IRAQ

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ABSTRACT

The present study aims to re-study the Qulqula Conglomerate Formation that is mentioned in the previous studies to be about 500m thick in Halabja - Avroman area. Those studies considered the Qulqula Conglomerate Formation as a part of Qulqula Group, which overlies Qulqula Radiolarian Formation and claimed Albion-Cenomanian age and deposited due to Subhercynian orogeny. They also mentioned that it is deposited in a deep basin of high tectonic activity in which the flysch is deposited and represented by thick succession of conglomerate and shale. In the present study, all the previously mentioned characteristics concerning tectonic, age and facies of the formation in the Avroman-Halabja area are not observed. More than that, the occurrence of the conglomerate that can be called "Qulqula Conglomerate Formation" is doubtful in this area. The authors have found a thick accumulation of conglomerate but it does not belong to Qulqula Conglomerate Formation. This is achieved according to following four facts: The first fact is that the observed conglomerate beds have dip angles nearly the same as that of the slope of the southwestern side of Avroman and Suren mountains. The second fact is that they are not covered by any strata, except soil. The third fact is that almost all clasts are derived from Avroman Limestone, which is located at higher elevation. The fourth fact is that the conglomerate overlies Qulqula Radiolarian Formation in an angular unconformity.. From these four facts, it was inferred that the conglomerate has the origin of proximal alluvial fan (fanglomerates), talus and slide blocks and debris that are deposited during Quaternary. It was also ascertained the absence of so-called wildflysch in previous studies.

فكرة جديدة عن اصل المدملكات المعروفة سابقا كتكوين قفلة المدملكاتي في منطقة

افرامان- حلبجة ، شمال شرق العراق

مشير مصطفى قادر بازياني و كمال حاجي كريم احمد

المستخلص

تهدف الدراسة الحالية الى اعادة دراسة كوين قفلة المدملكاتي التي يصل سمكه الى 500 متر في منطقة افرامان- حلبجة كما ذكر سابقا. في الدراسات السابقة وصفت تكوين قفلة المدملكاتي على انه جزء من مجموعة قفلة والذي يقع فوق تكوين قفلة الراديولاري. و كذلك اشارت الى اعتبار عمر التكوين (Albian-Cenomanian) والذي ترسب كنتيجة للحركة الاوروجينية تحت هرسينية والتي ترسبت في حوض عميق ذو فعالية تكتونية عالية (الاوجيوسينكلاين). و كنتيجة لهذه الفعالية التكتونية تكونت ترسبات الفلش الهائجة والتي تتكون من و المدملكات و الطفل. لكن في الدراسة الحالية لوحظ بان جميع المواصفات المذكورة اعلاه بما فيها و التكتونية و العمر الجيولوجي و السحنات الرسوبية غير موجودة في منطقة افرامان- حلبجة. اضافة الى ذلك لا توجد اية مدملكات يمكن تسمى "تكوين قفلة المدملكاتي" و لوحظت سمك كبير من مدملكات ولكن لا يرجع الى تكوين قفلة المدملكاتي . وهذا وفقا لاربعة ثوابت تالية : 1- ان ميل الطبقة المدملكات يساوي تقريبا زاوية الانحدار الطرف الجنوبي الغربي لطية افرومان و سورين. 2- ولا يغطيه اية طبقة الا التربة ، 3- ان معظم الحبيبات ترجع اصلها لتكوين الافرامان ، 4- ان المدملكات في منطقة افرومان - حلبجة تقع فوق تكوين قفلة الراديولاري بشكل عدم التوافق الزاوي. طبقا لاربعة النقاط المذكورة في الاعلاه يمكن استنتاج بان المدملكات وقد تعود في اصلها الى مراوح فيضية و رسوبيات المنحدرات و ركام الانزلاق التي تعود العصر الرباعي . كما اثبت عدم وجود السحنة Wildflysch بل اصح ان يسمى Mollasse facies. لذلك تم تغيير العمر من البليان-سينومانيان الى العصر الرباعي .

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INTRODUCTION

According to Buday (1980), Qulqula Conglomerate Formation overlies Qulqula Radiolarian Formation and the age and stratigraphic position of this group is controversial because of insufficient studies and complex structure of the occurrence area. The same author mentioned that the Qulqula Conglomerate Formation was first described by Bolton in 1955, but a more precise definition and description was given by the same author in 1958 and no changes were introduced in the definition of the formation since that time. According to Buday (1980) no fossil reported till that time and the contacts of the formation are not precisely defined and known. From the description of the Buday (1980) and from reconnaissance survey it appears that all conglomerates that overlaying Qulqula Radiolarian Formation are called Qulqula Conglomerate Formation.

Baziany (2006) and Karim and Baziany (2006, in press) have proved that the Qulqula conglomerate Formation, at the type locality, west of Qaladiza town, is nothing except a unit three of the Red Bed Series (conglomerate unit). According to results of the latter two studies, the present study tries to re-study the formation in Avroman–Halabja area also. The study concerned with the exposed conglomerate beds above Qulqula Radiolarian Formation according to a sedimentology, field relation and stratigraphy. Sissakian (1997) has indicated Qulqula Conglomerate Formation in Qandil area while in the studied area (Halabja-Avroman area) the formation has not shown on published map previously. In the present study, the geological map of Sissakian (2000) is used for indication of the conglomerate that previously called Qulqula Conglomerate Formation (Fig.1 and 2).

The studied area is located within Sulaimanyia Governorates in northeastern Iraq at the north of Halabja town. It is an elongated narrow belt extend from Khurmal town to northeast of Penjwin town (Fig. 1 and fig.2). The studied area includes Avroman and Suren mountains that border the Sharazoor plain at the northeast (Fig.1 and 2). A thick conglomerate beds is exposed along southwestern slope of the two mountains. This conglomerate is the only conglomerate found in this area that located above Qulqula Radiolarian Formation.

The aim of this study is try to answer the question: what are the age, nature and geographic location of the Qulqula Conglomerate Formation, which is mentioned to be exposed in Halabja-Avroman Area? This is by studding lithology, age, field relation and stratigraphy of the formation in the field and lab. Buday (1980) referred to the need of Qulqula Conglomerate Formation for extensive study. He indicated these studies as subdivision of the formation into individual units, definition of the boundaries and determination of the age. He also called for finding relation of adjacent formations in time and space.

GEOLOGICAL SETTING

The studied area is located within Western Zagros Fold-Thrust Belt. Structurally, the studied area is located within the Imbricated and Thrust Zones (Buday and Jassim, 1987, Jassim and Golf, 2006). The same authors, in their tectonic subdivision of Iraq put the studied area in the Qulqula-Khuakurk Subzone. The area is characterized by obscured anticlines and synclines which have been stacked together as very thick and tight packages of layers which overturned toward southwest or even over thrust. Stocklin (1974), called the studied area “Crushed Zone” this is because it is highly deformed.

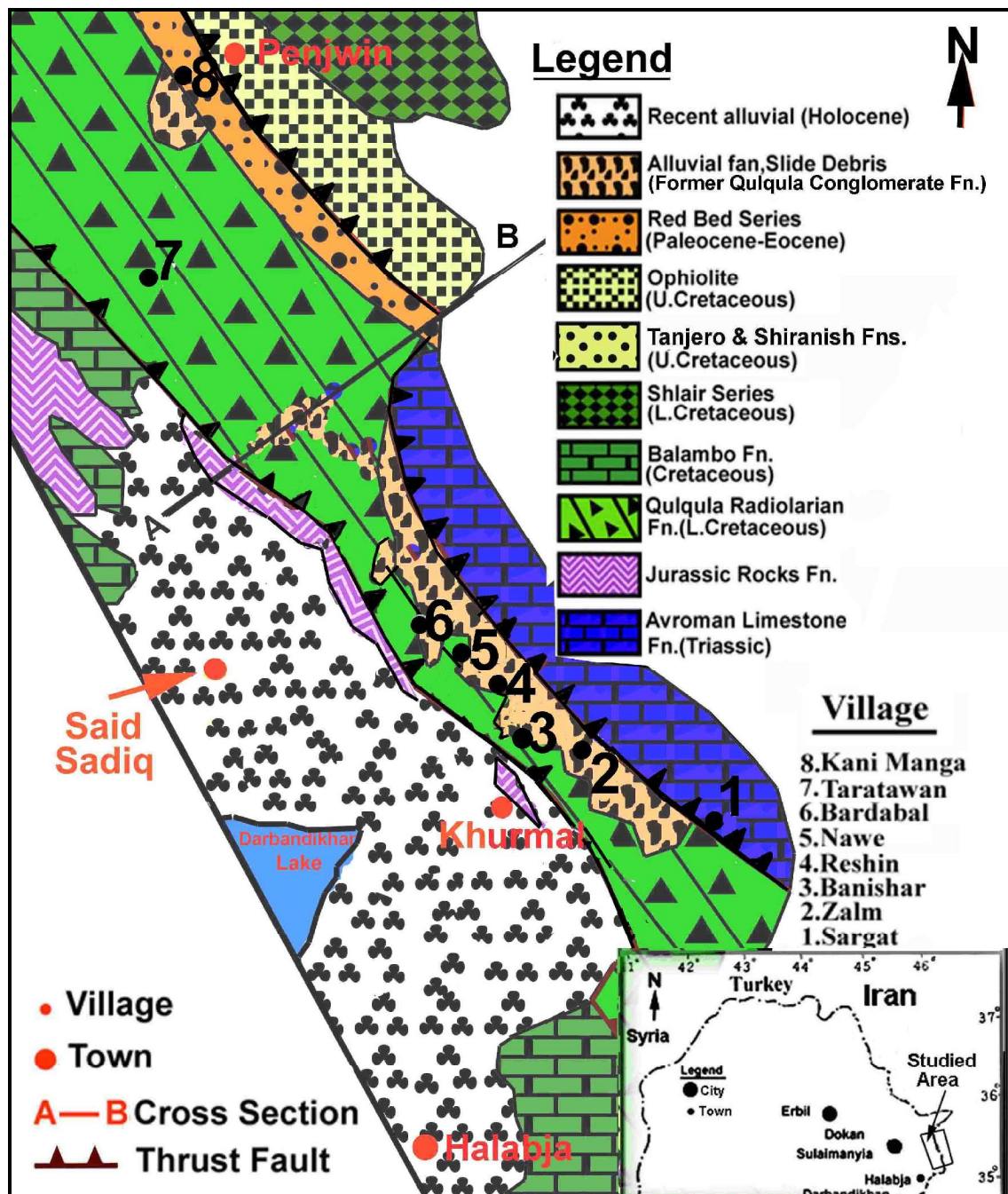


Fig.1: Geological map of the Penjwin-Khormal area showing the location of the Former Qulqula Conglomerate Formation (modified from Sissakian, 2000).

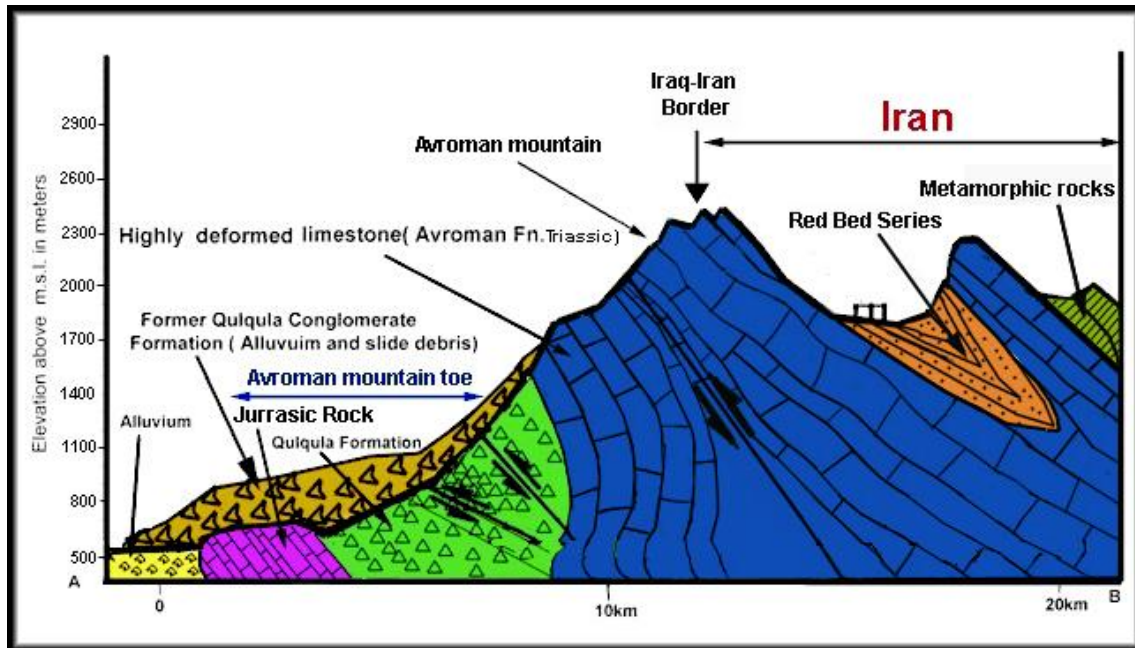


Fig. 2: Geological cross section of the Suren Mountain (western part of Avroman mountain) (modified from Ali and Ameen, 2005) showing the location Qulqula Conglomerate Formation.

STRATIGRAPHY AND LITHOLOGY

The conglomerates consist of angular to subangular and badly sorted blocks, boulders and gravels of grey or milky limestone which lithified by calcareous cements. They are grain supported and no sandstone and red claystone is found with these conglomerates. In most cases the clasts show some degree of transportation while others are extremely angular (Fig.3 and 4A). The thickness of the conglomerate is highly variable in this area which range between (1– 550m).

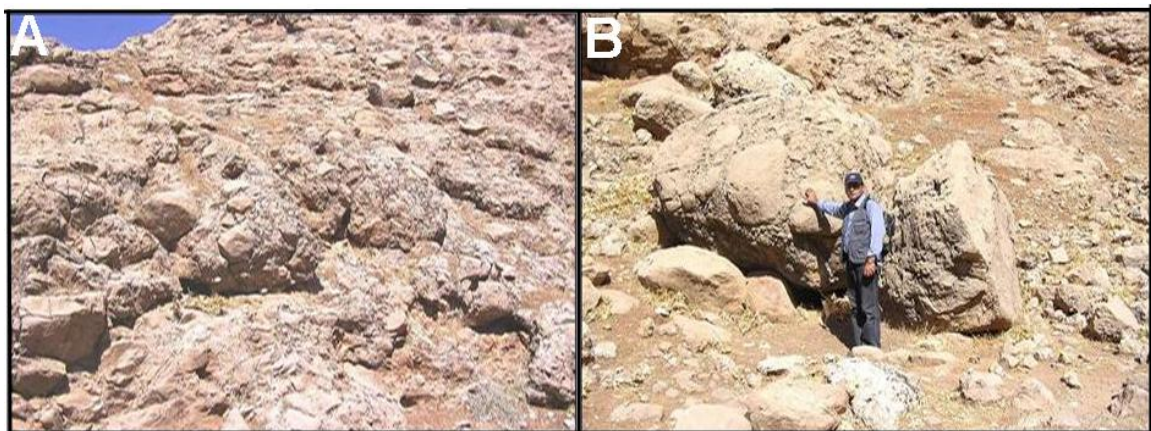


Fig.3: Course limestone fanglomerate (A) at 400m east of Zalm village and (B) at 1500m north of Banishar village, Avroman Mountain toe north of Halabja town.

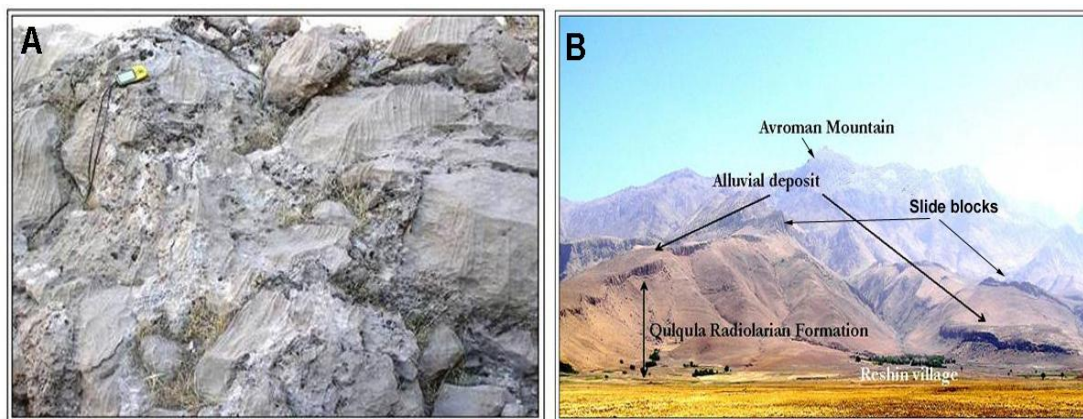


Fig.4: A) Rill weathering on lithified boulders of Qulqula Conglomerate Formation on the southwestern side of lower slope of Suren Mountain near Banishar village, northeast of Said Sadiq town.

B) Massive Sedimentary breccias as alluvial deposited above Qulqula Radiolarian Formation, north and east of Reshin village, at Suren Mountain.

Bolton (1958 in Buday, 1980) reported that Qulqula Conglomerate Formation, exist in Halabja-Avroman area and consist breccia but the amount of conglomerate is restricted. He further added that the conglomerate forms there tectonically small bodies and its age and other relations to chert and limestone (Qandil and Chuarta areas) is not clear. Jassim and Goff (2006) have mentioned that Qulqula Conglomerate has the thickness of 500m in Halabja area. In the present study, field survey is conducted for finding the conglomerate. The survey is succeeded by finding thick limestone conglomerates which have prerequisite of the formation as defined by Bolton (1955 in Buday, 1980). This is according to the following four points. The first point is that it is located at the top of the Qulqula Radiolarian Formation (Fig.4B). The second point is that its thickness, in some place, is about 500m as the case near Ahmad Awa village. The third point is that the conglomerate consists of limestone breccia (as a conglomerate when classification of Pettijohn, 1975, is considered). The fourth point is that there are other limestone and chert breccias in the area but they are located at the base of Qulqula Radiolarian Formation (below the limestone beds that are mentioned by Bolton, 1955). The thicknesses of these latter breccias are not more than 10m and located between Balambo (or older formations) and Qulqula Radiolarian Formation. These breccia (or conglomerate) is described by Karim (2003). According to first three points, the stratigraphic position and lithology of the limestone breccias are agreed with that mentioned by Buday (1980). But the age of the formation contradict with the ideas give previously. This is disagreements are discussed as four facts below.

The first fact is that the dips of the strata of the conglomerate that previously called “Qulqula Conglomerate Formation” are equal to the slope of the Avroman and suren mountains (Fig.4B and 5). This structural feature does not agree with age of Abian-Cenomanian that is indicated by Buday (1980) and Jassim and Goff (2006). This is because the deposition of the conglomerate is occurred after the anticline (or mountain) reached the present shape at Quaternary. The second fact is that the conglomerate is covered only by soil and there are no any stratigraphic units on the top (Fig.5). The third one is that nearly all clasts are derived from Avroman Formation which now located at higher elevation (Fig. 2, 4B and 5B). The Avroman Formation crops out at an elevation about 400m higher that the position of

the conglomerate. This relation of elevation further more proves the relation of the conglomerate with the Quaternary sediments not Albian-Cenomanian as mentioned by previous studies. The constituents of clasts of the conglomerate showed the same fossil as that of Avroman Formation which contain ghosts of ooids and oncoids (Fig.6). The ooids that are found in the conglomerate are compared with those found by Karim (2006d, in press), in the strata of Avroman Formation. The comparison showed the high degree of similarity which shows that the conglomerate is derived from Avroman Formation by erosion and mass wasting. They transferred from high elevation to the present position at lower elevation to deposit as alluvial fans, which later subjected to cementation (Fig.3). Therefore, the facies are all thought to be to molasse and wildflysch as mentioned by the previous studies (see Buday, 1980). The fourth fact is that the conglomerate not exists only on Qulqula Radiolarian Formation and occurs on Avroman Formation and on the Sharazoor plain (Fig.2 and 5). The fifth one is that the conglomerate overly the Qulqula Radiolarian Formation in angular unconformity relationship (Fig.2).

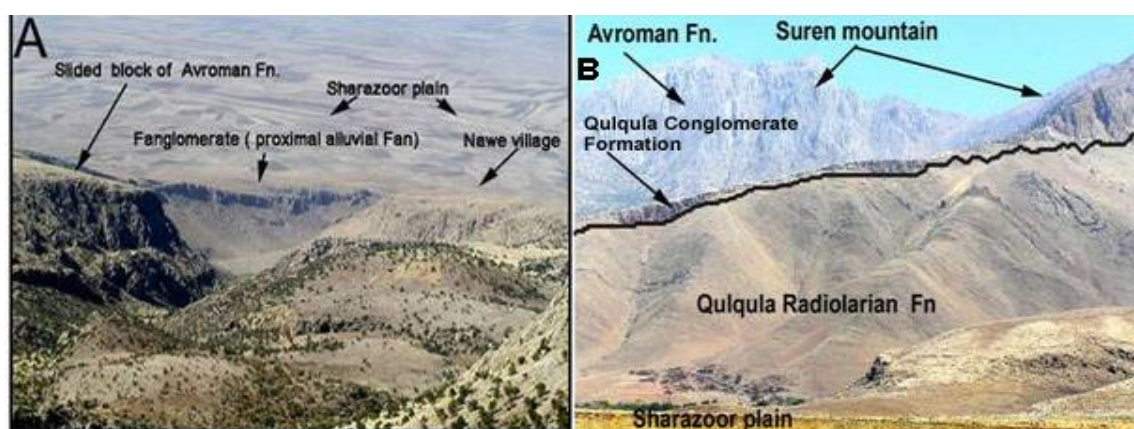


Fig.5: A) Qulqula Conglomerate Formation as can be seen from the summit of Suren Mountain.

B) Angularly resting of limestone breccia on Qulqula Radiolarian Formation at the north of Dara Gullan village with the dip angle nearly equal to slope angle.

From above five facts it was inferred that the conglomerate deposited during Quaternary not during Albian-Cenomanian. The conglomerate has deposited as proximal alluvial fan (fanglomerates), talus and slide blocks and debris, which later subjected to cementation. It is worthy to mention that according to Sissakian (personal communication) S. Z., Jassim has found similar Quaternary deposits (as conglomerate) in the same area during fieldwork in 1976. Sissakian (2000) has shown a conglomerate in the same area as Bammu conglomerates. But the relation of these conglomerates with Qulqula Conglomerate Formation is not indicated by them. The conglomerate exists as four geomorphologic forms as follows:

1-Thick bedded conglomerate

This type is the most common and exists as thick beds with lateral extension of several kms. It is exposed along the lower slope of southwestern side of Suren and

Avroman mountains to north of Khurmal and Said Sadiq towns. At these localities, in some cases, the conglomerate appears as thick massive limestone and shows rare granularity (Fig.4b and 5). The field study revealed that this type exist on both the Qulqula Radiolarian Formation and Avroman Formation. The conglomerate extends to near the peak of the Suren and Avroman Mountains at high elevation above 2200m. The conglomerate exists at this elevation as lithified massive or bedded talus. It consists of extremely angular gravels and boulders which are cemented by impure calcareous cement (Fig.7). The conglomerate is interpreted, in this study, as sediment of talus cone accumulated by gravitation falling and sliding.

2-Separate blocks of conglomerate

The second type occurs as relatively small and separate blocks; the largest of them has diameter of more than 30m. These blocks can be seen along the two paved roads to Nalparez from Shanadari and Kaolos especially between Tarratawan and Dolla Chawt villages (Fig.8). These blocks rest on Qulqula Radiolarian Formation and they consist of gravels of alluvial origin as they show sign of transportation. These blocks are most possibly, derived from bedded conglomerate (type one) by sliding from Suren mountain.

3- Slipped bedded blocks

Thick and massive beds can be seen over Qulqula Radiolarian Formation with the thickness of more than 500m (Fig.9). These beds rarely show granularity and laterally change to other types. Due to high thickness, massiveness and gray color it appear as Qamchuqa Formation as reported by Jovanovic and Gabre (1979) and Ali and Ameen (2005). These beds are previously assigned as Qulqula Conglomerate Formation. But in our interpretation, these beds are belonging to large blocks of Avroman Limestone which have slid as large blocks from high elevation and rested on Qulqula Formation. During sliding these blocks are suffered from some fracturing and brecciation. The conditions of the sliding of these blocks are nearly similar to those of Sinjar Formation in South of Sulaimanyia city, which are studied in detail by Karim and Ali (2004) and Ali (2005).

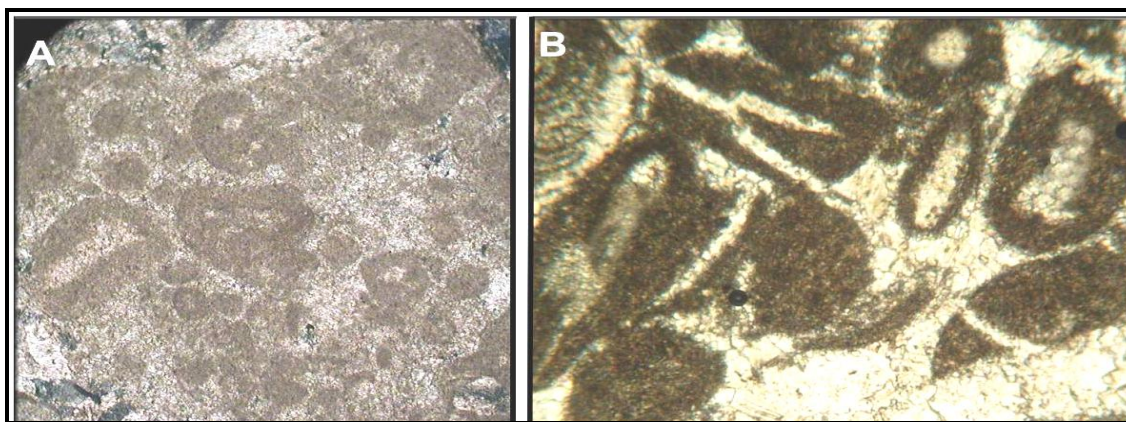


Fig.6: A) Thin section shows ghost of ooids in the sedimentary limestone breccias, southwestern side of the Suren Mountain, X20, N.L.
B) Thin section of limestone of Avroman Formation (taken from Karim, 2006d, in press). The comparison of these two photos shows that the clasts are derived from Avroman Mountain.

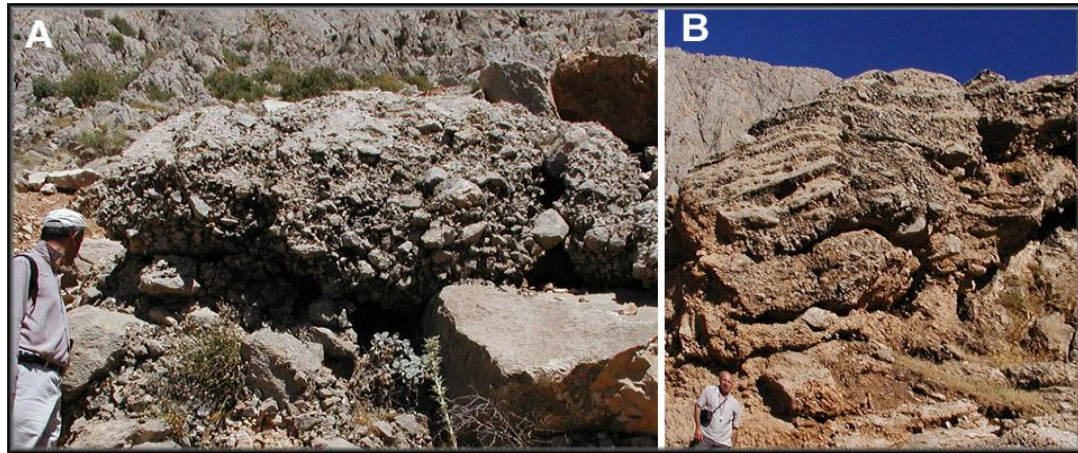


Fig.7: Lithified talus near the summit of Surren mountain on Avroman Formation at the elevation of 2200m, A: Massive talus . B: Stratified talus.

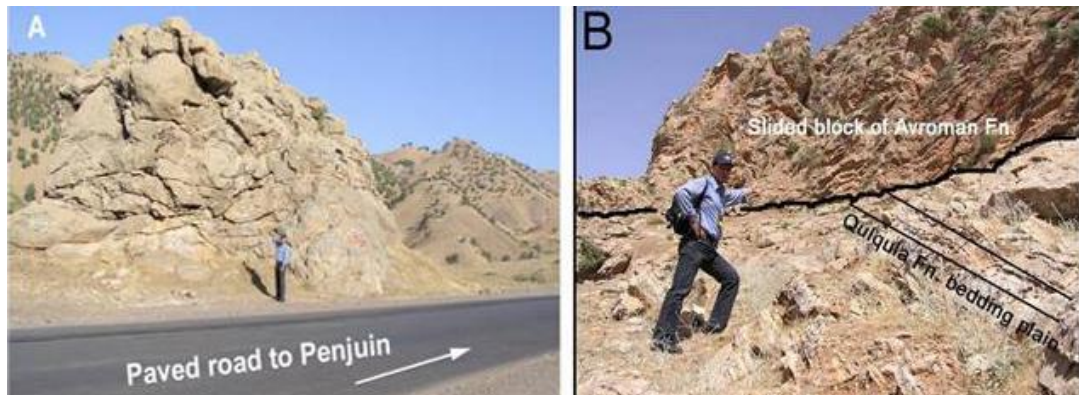


Fig.8: A: large block of breccia that located on the Qulqula Radiolarian Formation, directly to the west of Tarratawan village.

B) Angular relation between the formations and Qulqula Radiolarian Formation at Zalim valley.

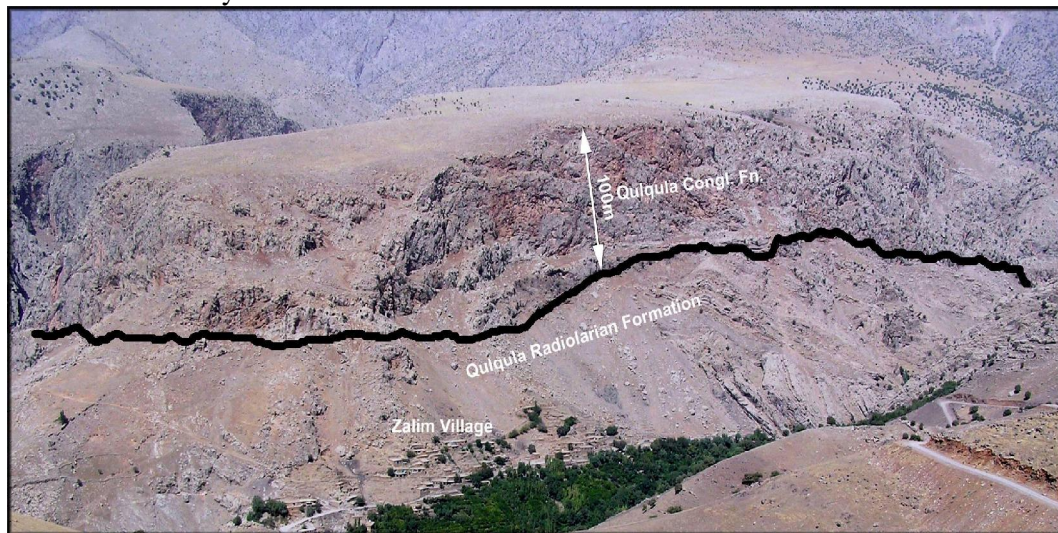


Fig. 9: Zalim valley (upstream of Ahmad Awa valley) showing Qulqula Conglomerate Formation (possibly as slipped blocks) overlying Qulqula Radiolarian Formation at angular unconformity.

CONCLUSIONS

This present study concluded the following:

- It is found that there is no occurrence of Qulqula Conglomerate Formation in the Halabja-Avroman area.
- For the first time, the Qulqula conglomerate Formation is studied in detail in Avroman-Halabja area which is overlying Qulqula Radilarian Formation.
- The lithology of Qulqula Conglomerate Formation, at Avroman-Halabja area, consists of thick beds of badly sorted angular pebbles, boulders and blocks of lithified limestone
- Most of the clasts are derived from Avroman Formation.
- The age of the formation is changed from Albian-Cenomanian to Quaternary. This is aided by geomorphologic, stratigraphic, structural and sedimentologic evidence.
- The facies of the formation is changed from wildflysch to molasse facies, which consist of sediments of fanglomerates, talus and slide debris and blocks.

REFERENCES

- Ali, S.S. 2005. Effect of landslide Masses on the groundwater occurrence in some areas of Sharazoor plain, NE-Iraq. Proceeding of International Conference and Field Seminars on water reservoirs and environmental problem in karst, Belgrade & Kotor, Serbia & Montenegro, Sept/2005, pp.215-222.
- Ali, S. S. and Ameen, D. A., 2005. Geological and hydrogeological study of the Zalim Spring, Sharazoor, and Sulaimaniya, Iraq. *Iraqi Journal of Earth Science*, V.5, No.1, pp.45-57.
- Baziany, M. M. Q., 2006. Sedimentology and stratigraphy of the former Qulqula Conglomerate Formation, Kurdistan region, NE-Iraq. Unpublished M. Sc. thesis, University of Sulaimani, 103p.
- Buday, T., 1980. Regional Geology of Iraq: Vol. 1, Stratigraphy: I.I.M Kassab and S.Z. Jassim (Eds) D. G. Geol. Surv. Min. Invest. Pub. 445p.
- Buday, T. and Jassim, S.Z., 1987. The Regional geology of Iraq: Vol. 2, Tectonism Magmatism, and Metamorphism. (I.I. Kassab and M. J. Abbas: Eds), Baghdad, 445 p.
- Bolton, C. M. G., 1958d. The Geology of Ranyia area. Site Inv Co. Unpubl. Report, SOM Library, Baghdad.
- Jassim, S.Z. and Goff, J.C. 2006. Geology of Iraq. Published by Dolin, Prague and Moravian Museum, Brno. 341p.
- Jovanovic, O. and Gabre, R., 1979. Results of sedimentologic examination of specimens from the area of Kaolos Dam project, Iraq. GEOZAVOD, Belgrade. 120p.
- Karim, K.H. 2000. A conglomerate bed as a possible lower boundary of Qulqula Formation, Chuarta-Said Sadiq area, NE-Iraq. *Kurdistan Academician Journal (KAJ)*, University of Sulaimani, 2(1) Part A.
- Karim, K. H., 2006 (in press). Stratigraphy and lithology of Avroman Formation, Kurdistan Region, NE-Iraq.
- Karim, K. H. and Ali, S. S. 2004. Origin of dislocated limestone blocks on the slope side of Baranan (Zirgoez) Homocline: An attempt to outlook the development of western part of Sharazoor Plain. *AKJ*, 3(1), pp.5-20.
- Karim and Baziany, 2006 (in press). Relationship between Qulqula Conglomerate Formation and Red Bed Series, at Qulqula area, NE-Iraq.
- Pettijohn, F. J., 1975. Sedimentary Rocks. Third edition, Harper and Row Publ. Co., 627p.
- Sissakian, V. K., 2000. Geological map of Iraq. Sheets No.1, Scale 1:1000000, State Establishment of Geological Survey and Mining. GEOSURV, Baghdad, Iraq.
- Stocklin G., 1974. Possible ancient continental margin in Iran, in Burk, C. A. and Drak C.L.(Ed). The geology of Continental Margins, Springer Verlag. New York, pp.873-887.