

On some Bivalvia From Fat'ha Formation (M. Miocene) at Sheikhan Anticline, N. Iraq

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Abstract

The present study comprises identification and description of some bivalvia from Fat'ha Formation at the northern limb of Sheikhan anticline, north of Iraq.

Six species belonging to six genera and four families have been identified. These are: (*Mytilus californianus*, *Nemocardium hantoniense*, *Paphia (Paphia) undulata*, *Clementia papyracea*, *Macra (Allomacra) sp.* and *Clausinella sp.*).

The first three mentioned species were recorded for the first time in Iraq.

The identified species are characterized by having small- to medium- sized shells. The shell size variability is most probably reflects different environmental factors, such as salinity fluctuation, insufficient oxygen and food supply, which maybe due to the lack of current action. These condition refer to shallow marine water. Therefore Fat'ha formation is more likely deposited in shallow water semi-closed Lagoonal environment.

Key words: Bivalvia, Fat'ha Formation, Middle Miocene, Sheikhan Anticline

Introduction

Sheikhan anticline is located about (55km) northeast of Mosul. It's limited between ($43^{\circ} 15' 20''$) and ($43^{\circ} 21' 20''$) Longitude and ($36^{\circ} 42' 20''$) and ($36^{\circ} 44' 07''$) Latitude (1), (Fig.-1).

The study area considered to be a part of the high mountain belt and tectonically belongs to the unstable shelf within the foothill zone (2). It is parallel to the Zagros series which generally trending northwest-southeast, comprising different stratigraphic units representing by Bekhme, Kolosh, Gercus, Pila'spi, Fat'ha, Injana and Mukdadiya formations (1).

Aim of the present study is to identify and describe the fossils of bivalvia which collected from the marl bed that located at the upper part of the Fat'ha Formation (Fig.-2).

Systematic Study

The identification of the studied taxa relied on the diagnosis of: (3), (Cox, et al., 1969, Cited by 4), (5), (6) and (7). The Classification of the identified fauna depended on (8).

Six species belonging to six genera and four families were identified and described by using their external and internal shell features and measured shell

parameters (shell height and shell length) see sketch diagram (Fig. 3).

The Synonyms references which not mentioned in the references list were cited by (9) and (10).

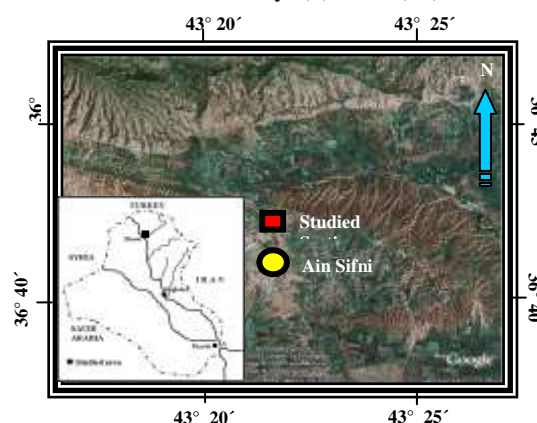


Fig. (1): Location map for the study area

Depository

All the species were deposited at the Mosul University, Department of Geology, lab number (201), under the specimen number (Sh 1 – Sh 13).

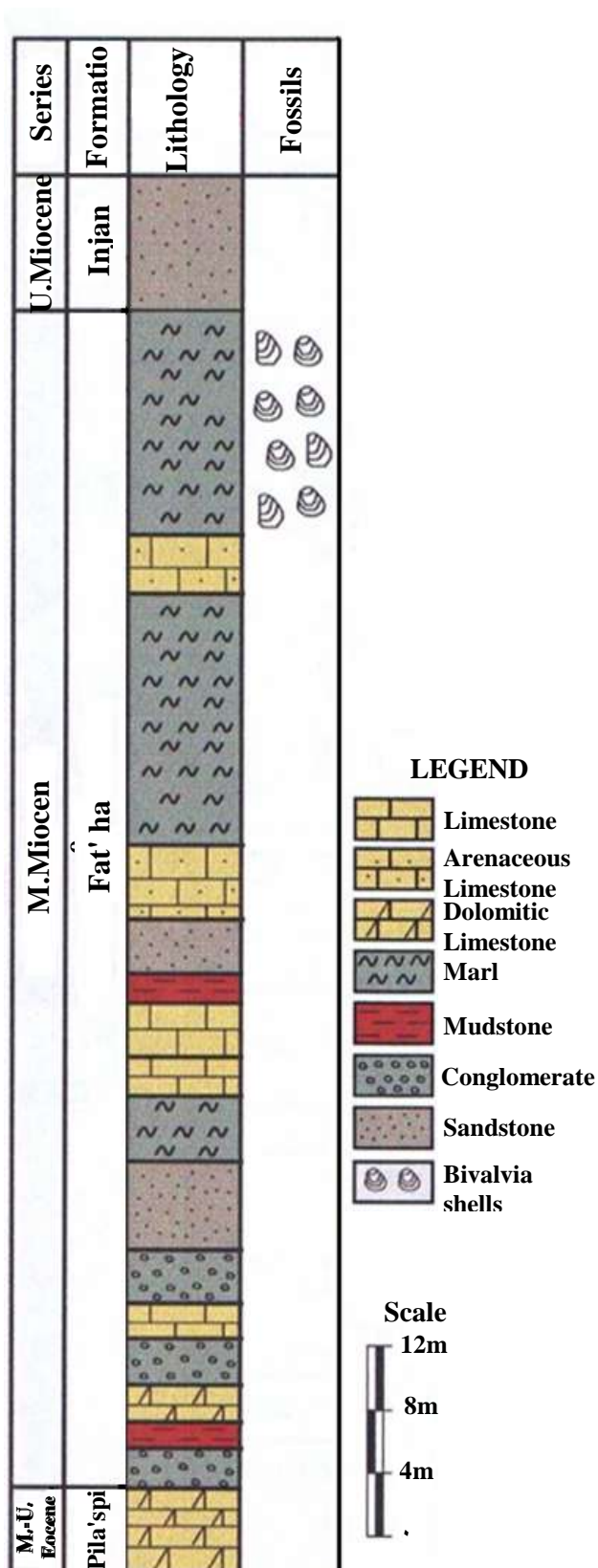


Fig (2): Lithological section of Fat'ha Formation, Sheikhan anticline

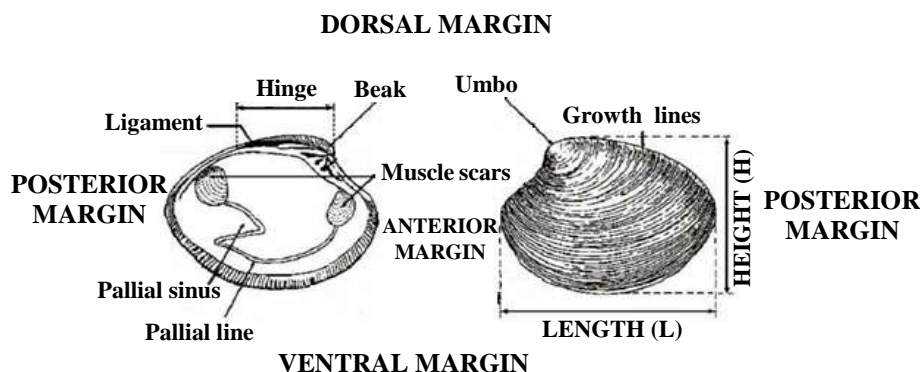


Figure (3): sketch diagram showing the measured bivalvia shell parameters; height and length means (H and L) respectively

Class: BIVALVIA Linne', 1785
 Subclass: PTERIOMORPHIA, Beurlen, 1944
 Order: MYTILOIDA Rafinesque, 1822
 Super family: MYTILACEA Rafinesque, 1815
 Family: MYTILIDAE Rafinesque, 1815
 Subfamily MYTILINAE Rafinesque, 1815
 Genus *Mytilus* Linne', 1758
 Type species: *Mytilus edulis* Linne' 1758, SD
Mytilus californianus Gonrad, 1837
 (Plate1, Fig. A)
 1837 *Mytilus californianus* Gonrad, P. 102

Dimensions:

| Specimen numbers (n) | height | length |
|----------------------|--------|--------|
| 1 | 2.4 | 1.6 |
| 2 | 2.5 | 1.8 |

Description:

Medium sized shell averaging about 68% as length as height (H= 2.5 cm, L= 1.7 cm. n=2). Shell subtriangular to wedge shape in outline, and in equilateral to semi equivalent valves. Dorsal margin triangular, umbo prosogyral (beak directed forward), anterior margin straight to smoothly concave in the middle, posterior margin convex, lateral margins converging in the ventral margin. External shell surface are well ornamented by numerous concentric growth lines, varying in number from 24 to 27. Ligament is external and curved posteriorly towards the umbones, no hinge teeth. Muscle scar is oftenly anisomyrian, the posterior scar larger than the anterior one.

Remarks:

(11) identified *Mytilus* sp. From the Fat'ha Formation in ain al-safra anticline Northeastern of Mosul city, which is differs from *Mytilus californianus* (Gonrad, 1837) in outline shell shape. The present species show some similarity to *Mytilus trossulus* Gould, 1850, but the latter differs in having a faint growth lines and the beak is more inclined forward than the present species.

Subclass: HETERODONTA Neumayr, 1884
 Order: VENEROIDA Adam & Adam, 1856
 Superfamily: CARDIACEA Lamarck, 1809
 Family: CARDIIDAE Lamarck, 1809
 Subfamily: LAEVICARDIINAE Keen, 1936
 Genus: *Nemocardium* Meek, 1876
 Type species: *Cardium semiasperum* Deshayes, 1858 SD
Nemocardium hantoniense Vonkoeenen 1901
 (Plate1, Fig. B)

1901 *Nemocardium hantoniense* Vonkoeenen, P.679.

Dimension

| Specimen numbers (n) | height | length |
|----------------------|--------|--------|
| 1 | 1.9 | 2.1 |
| 2 | 1.7 | 2.0 |
| 3 | 2.0 | 2.1 |

Description:

Medium sized shell averaging about 90% as height as length (H= 1.9cm, L= 2.1 cm. n=3). Oval to Subtriangular shell shape, slightly inequilateral and semiequivalent conjugated valves. Dorsal margin convex, anterior and posterior margins are subparallel and converging ventrally. Umbo prosogyral, umbonal area is strongly inflated and moderately raised over the cardinal area. Shell are well ornamented by numerous radial ribs, radiating from the umbo towards the ventro – lateral crenulated shell outline. A rib index is 3-4 ribs per mm counted on 2/3 of the shell height, surface crossed by very fine growth fila, muscle scar subequal, ventral margin crenulated.

Remarks:

The present species shows some similarities to *Nemocardium bechei* (Reeve, 1847) which is characterized by growth lines instead of the ribs, which the ribs formed diagnostic feature of the Iraqi species.

Superfamily: **VENERACEA** Rafinesque 1815

Family: **VENERIDAE** Rafinesque 1815

Subfamily: **CLEMENTIINAE** Frizzell, 1936

Genus: *Clementia* Gray 1825

Type species: *Venus papyracea* Gray 1825

Clementia papyracea (Gray 1825)

(Plate1, Fig. C)

1825 *Venus papyracea* Gray, XXV, P.137.

1927 *Clementia papyracea* (Gray); Cox, P.54; Pl. IV, Fig. 3 and4.

1928 *Clementia papyracea* (Gray); Douglas, III, P. 10; Pl. XIII, Fig. 10.

1928 *Venus (Clementia) papyracea* (Gray); Vredenburg, No. 50, P. 455, Pl. 32, Fig. 3.

1930 *Clementia papyracea* (Gray); Cox, pp. 130, Pl. XV, Fig.4.

1932 *Clementia papyracea* (Gray); Prashed, P.262.1936 *Clementia papyracea* (Gray); Cox. XXII, part 2, P.69.

Dimensions:

| Specimen numbers (n) | height | length |
|----------------------|--------|--------|
| 1 | 1.5 | 1.7 |
| 2 | 1.7 | 1.8 |
| 3 | 1.4 | 1.5 |

Description:

Small sized shell averaging about 88% as height as length (H= 1.5cm, L= 1.7cm, n=3). Ovate to semicircular in outline and inequilateral to equivalent conjugated valves. Umbo moderately raised, curved towards the anterior margin. Dorsal margin convex (anterior side of dorsal margin slightly lower than posterior side). The lateral shell margins are mostly subparallel, converging towards the ventral margin, to give the circular outline to the shell. External shell surface is mostly ornamented by numerous faint and smooth growth lines, ligament short and external, teeth heterodont.

Remarks:

Clementia papyracea was recorded from Fatha Formation (Lower Fars) in Iran, Cox,1936 Cited by 10) which is fairly identical with the Iraqi species from Fat'ha Formation, (10).

The present species shows some similarities to the *Clementia vatheleti* (Mabille, 1901), but differs in having faint growth lines while the *Clementia vatheleti* (Mabille, 1901) characterized with very prominent concentric growth lines pattern.

Subfamily: **TAPETINAE** Adam and Adam,1857

Genus: *Paphia* Röding, 1798

Type species: *Paphia alapapilionis* Linne', 1758, SD

Subgenus: *Paphia* s.st

Paphia (Paphia) undulata (BORN, 1778)

(Plate1, Fig. D)

1778 *Venus undulata* Born, P. 54.

1864 *Paphia undulata*(BORN, 1778); Reeve, Pl. 111, Fig. 8

1980 *Paphia undulata* (BORN, 1778); Al-Awadi, P.176, Pl. 12. Fig. 2.

Dimensions:

| Specimen numbers (n) | height | length |
|----------------------|--------|--------|
| 1 | 1.3 | 1.7 |
| 2 | 1.4 | 1.9 |

Description:

Small sized shell averaging about 77% as height as length (H= 14cm, L= 1.8 cm, n= 2). Oval to elongated laterally along the anterior – posterior axis, equivalent conjugated valves. Dorsal margin triangular (anterior side of dorsal margin slightly lower than posterior side), anterior and posterior margins are strongly convex, continuous with the ventral margin. Umbo occupies about one – third of the dorsal margin, umbonal area inflated and slightly higher than the cardinal area, lunule deep, escutcheon elongated. Surface is oftenly smooth with some very faint concentric growth line. Cardinal area thin, muscle scar anisomyrian.

Remarks:

The present species is fairly identical with *Paphia (Paphia) undulata* (BORN, 1778) described by (9), from recent deposits of Failahka island in Kuwait.

Subfamily: **CHIONINAE** Frizzell, 1936

Genus: *Clausinella* Gray, 1851

Type species: *Chione fasciata* Da costa, 1778

Clausinella sp.

(Plate1, Fig. E)

Description:

Medium sized shell, about 65% as height as length (H= 2.0cm, L= 3.1 cm. n= 2). Elongated in anterior - posterior direction, dorso-anterior margin inclined, posterior-dorsal margin slightly higher and shorter than anterior-dorsal margin, dorsal margin almost straight, joins the posterior margin with a gentle curve, anterior margin convex, umbo moderately curved upwards Shell surface is well ornamented by an obvious concentric ridges, counting up to 17.

Remarks:

The present species previously described by (9), from the Miocene deposits of northern Kuwait. And left under open nomenclature due to the lack of material and bad preservation.

Superfamily: **MACTRACEA** Lamarck, 1808

Family: **MACTRIDAE** Lamarck, 1808

Subfamily: **MACTRINAE** Lamarck, 1808

Genus: *Mactra* Linne, 1767

Type species: *Cardium stultorum* Linne', 1758, SD

Subgenus: *Allomactra* Tomlin, 1931

Mactra (Allomactra) sp.

(Plate1, Fig. F)

Dimensions:

| Specimen numbers (n) | height | length |
|----------------------|--------|--------|
| 1 | 1.0 | 1.4 |
| 2 | 1.2 | 1.5 |

Description:

Small sized shell averaging about 73% as height as length (H= 1.1 cm, L= 1.5 cm, n= 2). Triangular in shell outline, inequilateral to semiequivalent conjugated valves. Dorsal margin convex, the anterior and posterior margins are strongly inclined towards the ventral margin, which is slightly curved, umbo pointed, umbonal area slightly raised over cardinal area then dies out towards posterior – ventrally, external shell surface smooth.

Remarks:

Originally the present species recorded from Miocene sediments in Kuwait (9). However The Iraqi specimen shows some similarity in outline to the *Macra* (*Eomacra*) *liliacea* Lamarck, 1818, but the distinctive concentric growth ribs of the figured specimen led to the identification under the subgenus *Allomacra* Tomlin, 1931.

Discussion and Conclusion

Six species of bivalvia are identified and precisely described, three of them are recorded for the first time in Iraq. These are: (*Mytilus californianus*, *Nemocardium hantoniense*, and *Paphia* (*Paphia*) *undulata*).

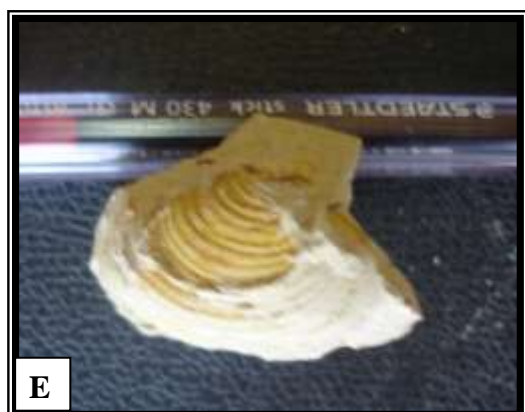
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PLATE 1

- Fig. A: *Mytilus californianus* Gonrad, 1837, X=1.5
- Fig. B: *Nemocardium hantoniense* Vonkoeenen 1901, X= 1.6
- Fig. C: *Clementia papyracea* (Gray 1825), X= 2.1
- Fig. D: *Paphia (Paphia) undulata* (BORN, 1778) X= 1.6
- Fig. E: *Clausinella* sp. , X= 1.1
- Fig. F: *Mactra (Allomactra)* sp. , X= 2.2

PLATE 1



بعض أصداف المحاريات من تكوين الفتحة (المايوسين الأوسط)

في طيه شيخان، شمال العراق

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الملخص

اشتمل البحث الحالي على تشخيص ووصف بعض متحجرات المحاريات من تكوين الفتحة ضمن الطرف الشمالي لطيه شيخان، شمال العراق. تضم حشود المحاريات المسجلة والموصوفة في هذه الدراسة ستة أنواع تابعة لستة أجناس وأربعة عوائل، وهي: (*Mytilus californianus*, *Nemocardium hantoniense*, *Paphia (Paphia) undulata*, *Clementia papyracea*, *Mactra (Allomactra) sp.* and *Clausinella sp.*)

الثلاثة أنواع الأولى سجلت في هذه الدراسة لأول مرة في العراق. من ناحية أخرى فإن الأصداف المدروسة كانت ذات أحجام صغيرة إلى متوسطة والسبب في ذلك يعود على الأغلب إلى الملوحة العالية ونقص الغذاء والأكسجين، ربما بسبب قلة التيارات البحرية، أن مثل هذه العوامل تتواجد غالباً في بيئة المياه الضحلة أو البحيرات الشاطئية الضحلة شبه المعزولة. لذلك فإن تكوين الفتحة قد ترسب في بيئة البحيرات الشاطئية الضحلة شبه المعزولة .

الكلمات الدالة: المحاريات ، تكوين الفتحة، المايوسين الأوسط، طيه شيخان