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# The Current State of Exotic Crustacean Decapoda Fauna in Syrian Marine Waters (Update and Review)

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## □ ABSTRACT □

Alien species represent an important part of the crustaceans of Syrian fowl, which are about 128 species. The total number of migratory species in Syrian waters recorded in this work make up only 27 species. This number represents 21.5% of all marine Decapoda known in Syria and 38.8% of introduced species in the Mediterranean. Decapoda species introduced into Syria belong to 10 different families and are spread over 22 genera. The family Penaeidae and the family Portunidae are the most represented in introduced species with 7 for each. The Leucosiidae family ranks second by the number of species with 4 lessepsian and then the Pasiphaeidae and Alpheidae families represented by two species. Only one introduced species has been reported for the following families: Palinuridae, Majidae, Matutidae, Xantidae and Pilumnidae. Of the 27 species decapod found in Syria, 5 have been reported for the first time in the marine waters of this country during the last decade and two among this, registered in 2017 for the first time. These species are *Melicertus hathor, Alpheus audouini, Arcania elongata, Matuta victor and Gonioinfradens paucidentatus*. It is accepted that alien species may have ecological, economic or health related influences, especially after they succeed in establishing dense population, or presenting invasive characters. The invasion of exotic species on the Syrian coast by the Suez Canal plays also a big role in modifying the original specific composition of Syrian waters.

**Key words**: Mediterranean Sea, Crustacea, Decapoda, Alien, Syrian coast, Suez Canal.

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# الواقع الحالي للقشريات عشاريات الأرجل الغريبة في المياه البحرية السورية (تحديث واستعراض)

**الدكتور حسان حسن***

**(تاريخ الإيداع 8 / 2 / 2018. قبل للنشر في 19 / 3 / 2018)**

## □ ملخّص □

تشكل الأنواع الغريبة جزءا هاما من فاونا القشريات عشاريات الأرجل في سورية و التي تعد حوالي 128 نوعا. إن إجمالي عدد الأنواع المهاجرة إلى المياه السورية و المسجلة في هذا العمل هو 27 نوعا فقط. يشكل هذا العدد حوالي 21.5 % من القشريات عشاريات الأرجل المعروفة في سورية و حوالي 38.8 % من الأنواع المهاجرة المعروفة في البحر الأبيض المتوسط. تتوزع هذه الأنواع على عشرة فصائل مختلفة و 22 جنساً و تعتبر فصيلة Portunidae و فصيلة Penaeidae من أكثر الفصائل تنوعا و ممثلة ب 7 أنواع لكل منها. تأتي بعدها فصيلة Leucosiidae ممثلة ب 4 أنواع مهاجرة في حين تم تسجيل نوعين مهاجرين لكل من فصيلة Pasiphaeidae وفصيلة Alpheidae ، أما بقية الفصائل و عددها خمسة فقد تم تسجيل وجود نوع واحد لكل منها. بعض هذه الأنواع تم تسجيلة في المياه البحرية السورية خلال السنوات الأخيرة و هي النوع *Melicertus hathor* و النوع *Alpheus audouini* و النوع *Arcania elongata* و النوع victor *Matuta* و النوع *Gonioinfradens paucidentatus*. من المقبول أن الأنواع الغريبة لها تأثيرات مختلفة، خاصة بعد أن نجح بعضها في إنشاء مجتمعات كبيرة في الوسط الجديد. إن غزو الأنواع الغريبة للشاطئ السوري عن طريق قناة السويس لعب و ما زال يلعب دورا كبيرا في تعديل التركيبة الأصلية لفاونا القشريات عشاريات الأرجل في المياه السورية كما أن له نتائج اقتصادية وبيئية هامة.

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## Introduction:

Decapoda crustaceans are one of the most representative groups of fauna in Syrian waters because of their specific diversity and the economic interest of certain species like shrimps and crabs. All the fauna decapod in the Levant basin account for 234 species, while the number of species registered in Syria is only 121 (Hasan, 2008).

This fauna is of Mediterranean type with subtropical affinity. The species fall into three categories. The first is that of Mediterranean endemic species (4 sp.). The second includes species that are found in both the Mediterranean and the Atlantic Ocean (95 sp.). the third category includes the Indo-Pacific and Red Sea forms that entered the Mediterranean via the Suez Canal (22 Lessepsian species) (Hasan 2008).

Since the opening of the Suez Canal in 1869, the waters of the Mediterranean and the Red Sea have been in direct contact (Fishelson, 2000, Golani *et al*., 2002) and the migration of species from the Red Sea via the Suez Canal to the Mediterranean began. The Current climate changes on the planet also favor the introduction of species and cause faunistic changes (Gómez and Claustre 2003). Favorable conditions like temperature, salinity and habitats present in the Eastern basin of the Mediterranean favors the introductions (Por, 2010) by making the conditions in the eastern basin of the Mediterranean close to those of the Red Sea. Species that arrived in the Mediterranean via the Suez Canal then colonized the eastern coast of the Mediterranean, including the Syrian coast. Some species are moving west along the North African coast and some have reached Tunisia and Sicily. However, the eastern basin is still the favourite destination for aliens due to its proximity to the Suez Canal and dense maritime traffic (Zenetos *et al.*, 2010b). There are many vectors for alien marine species such as commercial shipping activities, canals, aquaculture and fisheries (Bax *et al.,* 2003), but the majority of species introduced on the Syrian coast came through the Suez Canal.

A considerable number of species arrived in Syria have become common and have established stable populations in the Syrian coast such as *Charybdis hellerii* and *Thalamita poissonii* and many species such as *Marsupenaeus japonicus* have become invasive. Some arrived on the south coast of Turkey and also westwards to Tunisia and Sicily (Stevcic, 1979, Ben Tuvia, 1985).

In general, about 80% of introduced species would have no effect on native species and communities (Simberloff 1981), while 20% may have an impact in their new range. Bright (1998) defined the impact of introduced species on biodiversity by the term "Evolution in reverse". The introduction of non-native species into a marine environment is one of the four greatest threats to marine ecosystems.

The purpose of this work is to update the fauna of the Decapoda, introduced into the marine waters of Syria and to understand the origin of the introduced species and the methods of introduction and to evaluate the ecological and economic consequences of the lessepsian introduction into the marine environment of Syria.

## Materials and Methods:

The collection of alien species decapods as reported in the literature and from original data. The information used to establish a list of alien species in the Syrian marine waters is derived from two different sources. The first is the species lists reported in academic papers and technical reports related to crustacean decapods in Syria appearing during the last century and in recent years (Saker, 1992; Saker and Ammar, 1996; Farah, 1997; Saker and Farah, 1997; Ammar, 2002; Saker, 2002; Hasan, 2008; Hasan and Noel,

2008; Hasan *et al.*, 2008; Shreky, 2014). The second is the samples collected in 2017 along the Syrian coast and from different depths and at different times of the year.

Different sampling methods were used, such as hand collection, hand-towed net, substrate, trammel net, scraping, air sucker, dredge, grab, boat, seine, bottom trawl net, and analysis of fish stomach contents.

The Syrian coast was prospected from the border of Lebanon in the south to the border of Turkey in the north (fig.1.). Decapoda species were caught and sampled in a large number sites of coastal and deep marine waters. The selection of the surveyed localities was made in order to sample all possible biotopes of the Syrian coast.

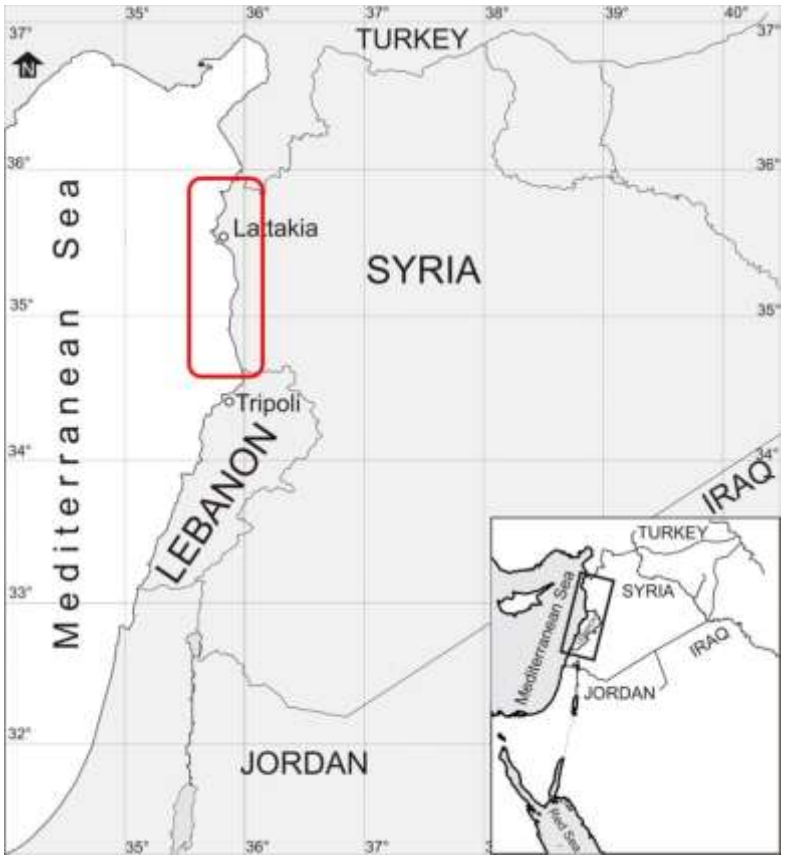



**Fig. 1. Map of the eastern Mediterranean coast, showing Syrian coast where the collection took place, (Syrian coast extend between 34.30.41◦N 36.00.49◦E in the south and 35.50.25◦N 35.59.39◦E in the north).**

## Results and Discussion:

The following list shows 27 introduced species of Decapod and one stomatopoda found in the marine waters of Syria. Of these species, two types, *Arcania elongata* Yokoya, 1933 and *Matuta victor* (Fabricius, 1781) were recorded on the Syrian coast by Hasan in 2017

Ordre DECAPODA Latreille, 1802
Family : Penaeidae Rafinesque, 1815
*Marsupenaeus japonicus* (Bate, 1888)
*Melicertus hathor* (Burkenroad, 1959)
*Metapenaeopsis mogiensis consobrina* (Nobili, 1904)
*Metapenaeus monoceros* (Fabricius, 1798)
*Metapenaeus stebbingi* Nobili, 1904
*Penaeus semisulcatus* de Haan, 1844
*Trachysalambria curvirostris* (Stimpson, 1860)
Family : Pasiphaeidae Dana, 1852
*Leptochela aculeocaudata* Paul'son, 1875
*Leptochela pugnax* de Man, 1916
Family : Alpheidae Rafinesque, 1815
*Alpheus audouini Coutière, 1905*
*Alpheus lobidens* De Haan, 1849
Family : Palinuridae Latreille, 1802
*Panulirus ornatus* (Fabricius, 1798)
Family : Leucosiidae Samouelle, 1819
*Arcania elongata* Yokoya, 1933
*Coleusia signata* Paulson, 1875
*Ixa monodi* Holthuis et Gottlieb, 1956
*Myra subgranulata* Kossmann, 1877
Famille Matutidae de Haan, 1835
*Matuta victor* (Fabricius, 1781)
Family : Majidae Samouelle, 1819
*Micippa thalia* (Herbst, 1803)

Family : Portunidae Rafinesque, 1815
*Callinectes sapidus* Rathbun, 1869
*Charybdis hellerii* (Milne-Edwards A., 1867)
*Charybdis longicollis* Leene, 1938
*Gonioinfradens paucidentatus* (A. Milne Edwards, 1861)
*Portunus pelagicus* (Linnaeus, 1758)
*Thalamita indistincta* Appel et Spiridonov, 1998
*Thalamita poissonii* (Audouin, *1826)*
Family : Pilumnidae Samouelle, 1819
*Heteropanope laevis* (Dana, 1852)

Family : Xanthidae Macleay, 1838
*Atergatis roseus* (Rüppell, 1830)

The Levant upper shelf biota has an ever increasing component of Erythraean aliens (Galil, 2012). Like the other coasts of the Levant Basin, The coast of Syria, has favorable habitats and conditions for Decapoda species from the Red Sea. The most recent lists shows 73 species of decapod and stomatopod crustaceans (71 of decapoda and 2 of stomatopoda). Of the 71 species decapod introduced into the Mediterranean, 51 species are present in the eastern part of the Mediterranean. With the exception of the species *Callinectes sapidus*, introduced by ballasts, all other introduced species (50 species) are

lessepsian and have penetrated into the Mediterranean Sea of the Red Sea via the Suez Canal. Only 27 species of Decapoda and one of stomatopoda introduced have been reported in Syria so far (see list above). Among them, two species (*Arcania elongata* Yokoya, 1933 and *Matuta victor* (Fabricius, 1781)) were reported in 2017 for the first time in Syria.

This number represents 21.5% of all marine Decapoda known in Syria and 38.8% of introduced species in the Mediterranean. Decapoda species introduced into Syria belong to 10 different families and are spread over 22 genera. The family Penaeidae and the family Portunidae are the most represented in introduced species with 7 for each. The Leucosiidae family ranks second by the number of species with 4 lessepsian and then the Pasiphaeidae and Alpheidae family represented by two species. Only one introduced species has been reported for the following families: Palinuridae, Majidae, Matutidae, Xantidae and Pilumnidae. Of the 27 species decapod found in Syria, 5 are reported for the first time in the marine waters of this country during the last decade and two among this, registered in 2017 for the first time. These species are *Melicertus hathor, Alpheus audouini, Arcania elongata, Matuta victor* and *Gonioinfradens paucidentatus*. Four species have been reported once in Syria, but during our surveys no specimens were found to confirm their presence.

The presence of these species in Syria remains to be confirmed especially as they are very rare in the Levant basin. The species *Leptochela aculeocaudata* was recorded only once on the Egyptian coast and one record in Lattakia by Ammar in 2002; *Heteropanope laevis* recorded first from Egypt (Calman, 1927 [1924]). Subsequently recorded from Italy, Tyrrhenian Sea (Taramelli, 1957) and from Syrian coast (Ammar, 2002). *Panulirus ornatus* is also very rare in the Mediterranean, it was reported only once on the eastern coast by Galil *et al.,* in 1989. The second capture of this species was in Syria by Ammar in 2002. A single female specimen of *A. elongata* was recorded from the Eastern coast of the Mediterranean for the first time by Hasan 2017. The adult specimen (♀) ovigerous was collected by fishing nets from the coast of Jableh in Syria at 45 to 60 m deep on a rock bottom.

The vast majority of introduced species in the Levant Basin have entered the Mediterranean via the Suez Canal. Nevertheless, it should be noted that there are other ways of introducing species into the Levant Basin and other parts of the Mediterranean. In the list of species introduced on the coast of Syria, the species *Callinectes sapidus* is the only one that arrived in the Mediterranean, from the western Atlantic, by ballastal waters that all other species have entered the Mediterranean through the Suez Canal (lessepsian species).

An introduced species can borrow several successive vectors (Minchin and Gollasch, 2002). Most Lessepsian species have been introduced into the Mediterranean through natural distribution, but it is also very likely that some species have arrived by other means such as ballast water. The presence of species reported only once for a long time in the Mediterranean and far from the Suez Canal suggests that these species have probably arrived by ballast water. This is the case of *Heteropanope laevis*, found in Italy by Taramelli in 1957, and also *Daira pelata* and *Macrophtalmus graeffei* crabs, which have been collected in southern Turkey for a long time but have not been reported elsewhere until now. Another species recently arrived on the coast of the Levant Basin is the species *Thalamita indistincta* which was collected for the first time on the coast of Tripoli in Lebanon and then from Latakia in Syria (Hasan and Noël, 2008). This species is distributed over a narrow area in the Gulf of Aden and the Gulf of Oman (Apel and

Spiridonov 1998, Apel 2001) but has not been reported in the Red Sea. The absence of this crab in the Red Sea suggests its possible arrival by ballast water.

In the marine waters of Syria and depending on the size of the populations and the density, three types of species introduced by the Suez Canal can be distinguished:

1) Rare species arriving on the Syrian coast have failed to establish their own significant populations. This is the case of *Metapenaeopsis mogiensis consobrina*, *Micippa thalia*, *Coleusia signata*, *Thalamita indistincta* and *Heteropanope laevis*. *Micippa thalia* crab is rare in the Levant Basin (see Galil *et al.*, 2002), it was reported for the first time in Turkey, in 1994 and later in Lebanon in 1999. This species was collected in April 1993 in Ibn Hani, Syria at shallow depths. It has remained unidentified until the year 2006. Our report shows that the species was present in the Mediterranean at least a year before it was first discovered in this sea. *Thalamita indistincta* is also a rare species, recently arrived in the Mediterranean and it has not yet developed large populations. It was collected for the first time in the Mediterranean from the coast of Tripoli in Lebanon in 2002, and then from Latakia in Syria in 2006 (Hasan and Noël, 2008). Specimens from Lebanon and Syria have been identified at the National Museum of Natural History in Paris. The species *Metapenaeopsis mogiensis consobrina*, and *Arcania elongata* and *Coleusia signata* were recorded a few times.

2) Other species have established small but stable populations such as *Alpheus lobidens*, *Leptochela pugnax*, *Ixa monodi*, *Myra subgranulata* (see Table.1). These species are found along the coast of Syria at different depths, *Ixa monodi* and *Myra subgranulata* appear regularly in the nets of fishermen and also *Leptochela pugnax*. *Alpheus lobidens* is also often present on the coast of Syria, especially in the northern part of the coast on sandy bottoms, rocks and sometimes between seaweed (Padina).

3) The abundant migrant species. Some species such as *Marsupenaeus japonicus*, *Melicertus hathor, Metapenaeus monoceros, Metapenaeus stebbigni, Penaeus semisulcatus, Trachysalambria palaestinensis, Matuta victor, Callinectus sapidus crabs, Portunus pelagicus, Charybdis hellerii, Charybdis longicollis,Gonioinfradens paucidentatus, Thalamita poissonii, Atergatis roseus* are common along the Syrian coast (see Table.1) . These species have become particularly abundant on the Syrian coast and are often collected by divers and fishermen. Among them, some have contributed to the modification of the original composition of the fauna by their impacts on the species and on the indigenous communities or on the landscapes.

Although the species *Matuta victor* has recently been registered in the Syrian marine waters, it is widespread and has managed to establish a stable population.

This phenomenon, called biological pollution (Sindermann *et al.*, 1992, Bright 1998, Bourdouresque and Verlaque 2002a), has important ecological and economic consequences.

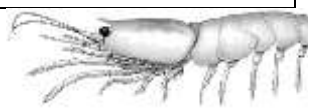
It is generally accepted that alien species may have ecological, economic or health related influences, especially after they succeed in establishing dense population, or presenting invasive characters (Cinar *et al*. 2011). The invasion of exotic species on the Syrian coast by the Suez Canal plays a big role in modifying the original specific composition of Syrian waters. However, for most of the 26 introduced species in Syria, there is no real study of their ecological or economic consequences. It is therefore difficult today to say whether or not the species has an impact on Syrian biodiversity. However, the ecological and economic impacts of some species (*Alpheus lobiden, Charibdis hellerii, Marsupenaeus japonicus*) on marine ecosystems in Syria are fairly well known (see

Table.1). These impacts are very pronounced on the other coasts of the province of Lessepsian migration (Boudouresque, 2005).

Some species introduced into the marine waters of Syria have a significant impact on biodiversity and the ecology of the marine environment. The ecological impacts are not limited to the modification of the niches, they also cause the modification of the functioning of the ecosystem. This is the case of *Charibdis hellerii*, *Charybdis longicollis* and *Thalamita poissonii*, which have created large populations in the marine waters of Syria. Their abundance probably played a role in modifying the functioning of infra littoral ecosystems.

**Table 1. Species introduced on the Syrian coast and their economic and ecological impacts: I.W-P (Indo-Western-Pacific); I.P (Indo-Pacific); I. O (Indian Ocean), R.S (Red Sea), G.A (Gulf of Aden); G.O (Gulf of Oman); W. A (Western Atlantic).**

| Species (Scientific nome) | Date and location of record in Syria | Status | Origin | Introductory vectors | Impact | Economic importance | Image |
|---|---|---|---|---|---|---|---|
| *Marsupenaeus japonicus* (Bate, 1888) | Latakia (1928) | very abundant | I.P | Suez Canal | Movement of an endemic species (*M. kerathurus*) | Commercial |  |
| *Melicertus hathor* (Burkenroad, 1959) | Jableh (2009) | Abundant | I.O | Suez Canal | unknown | Non |  |
| *Metapenaeopsis consobrina* (Nobili, 1904) | Banyias (2006) | Rare | I.W-P | Suez Canal | unknown | Non |  |
| *Metapenaeus monoceros* (Fabricius, 1798) | Latakia (1980) | Abundant | I.W-P | Suez Canal | Movement of an endemic species (*M.* | Commercial |  |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | *kerathurus*) | | |
| *Metapenaeus stebbingi* Nobili, 1904 | Latakia (1995) | Abundant | I.O | Suez Canal | Movement of an endemic species (*M. kerathurus*) | Commercial |  |
| *Penaeus semisulcatus* de Haan, 1844 | Latakia (1928) | Abundant | I.W-P | Suez Canal | Movement of an endemic species (*M. kerathurus*) | Commercial |  |
| *Trachysalambria curvirostris* (Stimpson, 1860) | Latakia (1995) | Abundant | R.S | Suez Canal | unknown | Commercial |  |
| *Leptochela aculeocaudata* Paul'son, 1875 | Latakia (2002) | very Rare | I.P | Suez Canal | unknown | Non |  |
| *Leptochela pugnax* de Man, 1916 | Latakia (1995) | Rare | I.W-P | Suez Canal | unknown | Non |  |
| *Alpheus audouini Coutière, 1905* | Jableh (2009) | Rare | I.P | Suez Canal | unknown | Non |  |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Alpheus lobidens* De Haan, 1849 | Latakia (2006) | Abundant | I.O | Suez Canal | Movement of an endemic species (*A. dentipes*) | Non |  |
| *Panulirus ornatus* (Fabricius, 1798) | Banyias (2002) | Rare | I.W-P | Suez Canal | unknown | Non |  |
| *Arcania elongata* Yokoya, 1933 | Jableh (2017) | Rare | I.P | ships and ballast?? | unknown | Non |  |
| *Coleusia signata* Paulson, 1875 | Latakia (1994) | Rare | I.W-P | Suez Canal | unknown | Non |  |
| *Ixa monodi* Holthuis et Gottlieb, 1956 | Latakia (1995) | Common | R.S | Suez Canal | unknown | Non |  |
| *Myra fugax* (Fabricius, 1798) | Latakia (1994) | Common | I.O | Suez Canal | unknown | Non |  |
| *Matuta victor (Fabricius, 1781)* | Tartus (2017) | Common | I.P | Suez Canal | unknown | Non |  |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Micippa thalia* (Herbst, 1803) | Latakia (1996) | Rare | I.P | Suez Canal | unknown | Non |  |
| *Callinectes sapidus* Rathbun, 1869 | Banyias (2000) | Abundant | W.A | Ballast | Unknown | Non |  |
| *Charybdis hellerii* (Milne-Edwards A., 1867) | Latakia (1993) | Common | I.W-P | Suez Canal | Nuisance to fishing | Non |  |
| *Charybdis longicollis* Leene, 1938 | Banyias (2006) | Common | I.O ;I .P | Suez Canal | Nuisance to fishing | Non |  |
| *Gonioinfradens paucidentatus* (A. Milne Edwards, 1861) | Lattakia (2014) | Common | I.P | Suez Canal | Nuisance to fishing | Non |  |
| *Portunus pelagicus* (Linnaeus, 1758) | Latakia (1928) | Abundant | I.P | Suez Canal | Unknown | Commercial |  |
| *Thalamita indistincta* Appel et Spiridonov, 1998 | Latakia (2008) | Rare | G.A G.O | Suez Canal ?? or Ballast ?? | Unknown | Non |  |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| *Thalamita poissonii* (Audouin, 1826) | Banyias (2002) | Abundant | I.W-P | Suez Canal | Unknown | Non |  |
| *Heteropanope laevis* (Dana, 1852) | Banyias (2002) | Rare | I.P | Suez Canal | Unknown | Non |  |
| *Atergatis roseus* (Rüppell, 1830) | Latakia (1994) | Common | I. P | Suez Canal | Unkı | Non |  |

The competition between some introduced species and native species has resulted in a significant change in the Decapoda fauna of Syria. Some species have become extremely abundant, altering the original composition of the Decapods of Syria. This is the case of the lessepsian species *Alpheus lobidens, Portunus pelagicus, Charybdis hellerii, Charybdis longicollis* and *Thalamita poissonii*, which, very common, appear in large quantities in fish nets. These species are very common on the other coasts of the Levant basin (Galil, 2007). A number of penaeid species have also been successful in establishing common and stable populations such as *Metapenaeus monoceros, Metapenaeus stebbingi, Marsupenaeus japonicus, Penaeus semisulcatus, Trachypenaeus curvirostris*. Among them, the shrimp *Marsupenaeus japonicus* competes with native shrimp *Melicertus kerathurus* (Galil, 2000), which has been gradually replaced in the marine waters of Syria in recent years. This shrimp was very abundant and fished, but today it has completely disappeared from the coast of Syria. The replacement of *Melicertus kerathurus* began to occur on the Tunisian coast where *Trachypenaeus curvirostris* arrived and established large populations (Jarboui and Ghorbel, 1995). The arrival of small Alpheidae shrimps has also contributed to the modification of biodiversity. The shrimp *Alpheus rapacida* found on the mudflats in the Levant Basin has become more common than the native species *Alpheus glaber* which occupies the same habitats (Lewinsohn and Galil 1982, Galil 1986, 2006). Another lessepsian alphide, *Alpheus lobidens*, arrived on the Syrian coast and became more common than the native *Alpheus dentipes* species because of competition on rocky habitats. The arrival of Lessepsian species has led to a greater or lesser decrease in the density of populations of many species on the Syrian coast.

Among the Lessepsian species, some are of commercial interest on the coasts of the different countries of the Levant basin. These species were exploited as soon as they arrived in the Mediterranean, especially on the coast of Syria and Palestine. The crab *Portunus pelagicus* is the first Lessepsian decapoda that has arrived in the Mediterranean and is of commercial interest. This species has been present on the Haifa fisheries since 1900 (Fox, 1924, Calman, 1927) and also on fisheries on other coasts of the Levant Basin.

*Portunus pelagicu*s is the most common crab on the sandy coast of Syria, it is collected by gillnets but discarded at sea on some parts of the coast. The shrimp *Marsupenaeus japonicus* is very common and has a significant commercial interest in the markets of Syria. This species and other migrant species are very expensive in Syrian markets, especially *Metapenaeus monoceros, Metapenaeus stebbingi* and *Penaeus semisulcatus* and also on the coasts of neighboring countries (see Holthuis, 1987a). In spite of their economic interest, Lessepsian shrimps *Marsupenaeus japonicus* and *Trachypenaeus curvirostris* have played a negative role in biodiversity by replacing native species of similar interest. This is the case of the shrimp *Melicertus kerathurus* which was eliminated by these two species, whereas it was largely fished in Syria. This shrimp has also been eliminated on other parts of the coast in the Levant basin, but also on the Tunisian coast (Jarboui and Ghorbel, 1995, Boudouresque, 2005, Galil, 2007).

As a result, the arrival of migrant species from the Red Sea via the Suez Canal on the Syrian coast has led to major changes in the biodiversity of Decapoda in this part of the Mediterranean. This migration had a negative impact not only on the ecology and functioning of the marine ecosystem, but also on the composition of the fauna of the Decapoda of Syria. In addition, this migration has allowed the arrival of species of significant economic interest, which can be exploited as food resources that are fishing, or aquaculture.

Surveys conducted in Syria on the coast and in the last years have confirmed the presence of most of the species already reported. They also added 5 new species to the general list of alien Decapoda from Syria. The total number of Decapoda now known from Syria amounts to 126 species. Of these species, 26 are Lessepsian and have entered the Mediterranean from the Red Sea via the Suez Canal and the species *Callinectes sapidus*, introduced by ballasts. Of these, five are reported recently: *Melicertus hathor, Alpheus audouini, Arcania elongata, Matuta victor* and *Gonioinfradens paucidentatus*. The number of alien Decapoda species reported in Syria represents only half of the species present in the Levant Basin and neighboring countries. Dozens of alien species have been added to the fauna of decapoda of the Levant Basin in recent decades. At least 44 introduced species are present in adjacent waters and most likely in Syria, but are not yet reported in this country. According to Ahyong and Galil, 2006; Özcan *et al.*, 2006; Shane *et al.*, 2006; Galil *et al.*, 2008; Hasan and Noël, 2008, about 48 species of Decapoda and two stomatopods from the Red Sea are present in the Levant Basin.

The small number of introduced species reported in Syria suggests that Syrian fauna still includes other species compared to neighboring countries. There is, therefore, a great need for studies and research in Syria to confirm the presence of species registered in adjacent marine waters.

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