

Conference Paper

## Brachyura (Decapoda crustacea) from the Mediterranean waters of Egypt

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During a recent investigation of the brachyuran fauna of the Egyptian Mediterranean water 41 species belonging to 29 genera were identified. Of these 17 species were new to this area. Of these species *Sphaerozium nitidus* Stimpson was new to the Mediterranean fauna, and *Pilumnus villosissimus* (Rafinesque) and *Inachus communissimus* Rizza may be regarded as new to the eastern Mediterranean. In this paper taxonomic problems are discussed in addition to the ecology, distribution, and economic importance of these species.

### INTRODUCTION

Apart from the work of Balss<sup>1</sup> on the Crustacean decapods of the fishery grounds near Alexandria, no particular work has been done on this group in the Egyptian Mediterranean waters during the past decades of this century. Furthermore, in the last few years, as a result of the cessation of the Nile flood discharge, the fauna and flora of the south eastern Mediterranean has been subjected to great changes.

In order to study the present composition and distribution of bottom organisms and to follow the changes in the composition and/or abundance of the fauna that might have taken place during the last few years, a survey of the shelf fauna along the Mediterranean coast of Egypt has been carried out during 1969—1971. This paper entails a summary of the results concerning the composition, distribution and abundance of the brachyuran crabs recorded during this investigation.

### *Area investigated*

The area investigated (Fig. 1) lies between Long. 29° 00' E and 32° 28' E; it extends between Arabs Bay in the West and Port Said in the East. Thus it covers the following different ecological regions:

a — The western region which lies between Arabs Bay and the Abou Kir peninsula. This region receives brackish water through two main sources; (1) Mex pumps which discharge about  $100 \times 10^6$  m<sup>3</sup> of brackish water annually in Mex Bay. (2) Domestic sewage effluents, about  $55 \times 10^6$  m<sup>3</sup> annually discharged in front of the Kayed Bey citadel. The effect of land drainage in this region seems to be localized around the points of discharge where the salinity varies from 34‰ to 38.5‰. The salinity of the oceanic water varies from 38.4‰—

39.4‰<sup>2</sup>. The bottom in this region, down to a depth of 30 m, is mostly of a sandy nature densely populated with *Caulerpa* and *Halimeda* in most of its parts. In deeper waters, muddy bottom predominates with less plant vegetation.

b — Abou Kir Bay, lying between the Abou Kir peninsula and the Rosetta mouth of the River Nile. The bottom of the Bay is mostly sandy particularly in the central and western parts with some rocky islands in its north western part. In the eastern part, the bottom is mostly muddy. The area of the Bay receives fresh water from adjacent Rosetta Nile branch, brackish water from lake Idku through the El-Maadia Channel and the industrial wastes of two paper factories through the outfall of the Tabia Pumping Station. The magnitude of the fresh water discharged through the first source is now nearly negligible, while the amount of industrial wastes discharged into the Bay is becoming more pronounced. The south western part of the Bay exposed to the effect of these industrial wastes is highly polluted. Outside the Bay and at greater depths, muddy bottom predominates. The salinity of the surface water of the Bay varies from 20‰ — 37‰. In the offshore waters off the Bay the salinity varies between 38‰ and 39.4‰.

c — The bottom in the eastern region between Rosetta and Damietta is mostly muddy interrupted with sandy patches in different places particularly between Borullus and Damietta. Surface salinity varies between *Ca* 38‰ near the shore and *Ca* 39‰ in the oceanic waters. Since 1966, the Nile water which used to discharge through the Damietta branch was completely stopped.

Between Damietta and Port Said including the Port Said Harbour, the bottom is mostly muddy in nature.

In this region, brackish water from Lake Manzalah discharges into the sea through Boughaz El-Gamil and also into Port Said Harbour through the El-Abouti Canal.

The salinity of the neritic water influenced by the land drainage in this region fluctuates from 36—38.5‰.

#### MATERIAL AND METHODS

Qualitative samples were collected by trawling using an Italian trawl particularly at greater depths. In shallow waters, a triangular dredge was used. In the Port Said Harbour, as the bottom was scarcely inhabited, samples were collected from buoys scattered in the Harbour as well as from piers, quays and platforms.

A total of 481 samples covering the whole area investigated were examined. These comprise 230 samples collected from 35 stations sampled monthly over a period of one year from the region between Port Said and Damietta including Port Said Harbour, 30 samples collected from the region between Damietta and Rosetta, 195 samples collected seasonally from 105 stations covering the region of Abou Kir Bay to a maximum depth of 230 m, and 26 samples collected from the area west of Abou Kir.

#### RESULTS

##### 1 — *Species recorded*

In this study 41 species belonging to 29 genera of Brachyuran crabs were recorded, 17 of them are new records for Egyptian Mediterranean waters (Table I). They are: one species, *Sphaerozium nitidus*, recorded for the first time from the Mediterranean Sea; and two species, *Inachus communissimus* and *Pilumnus villosissimus* are new records for the eastern Mediterranean.

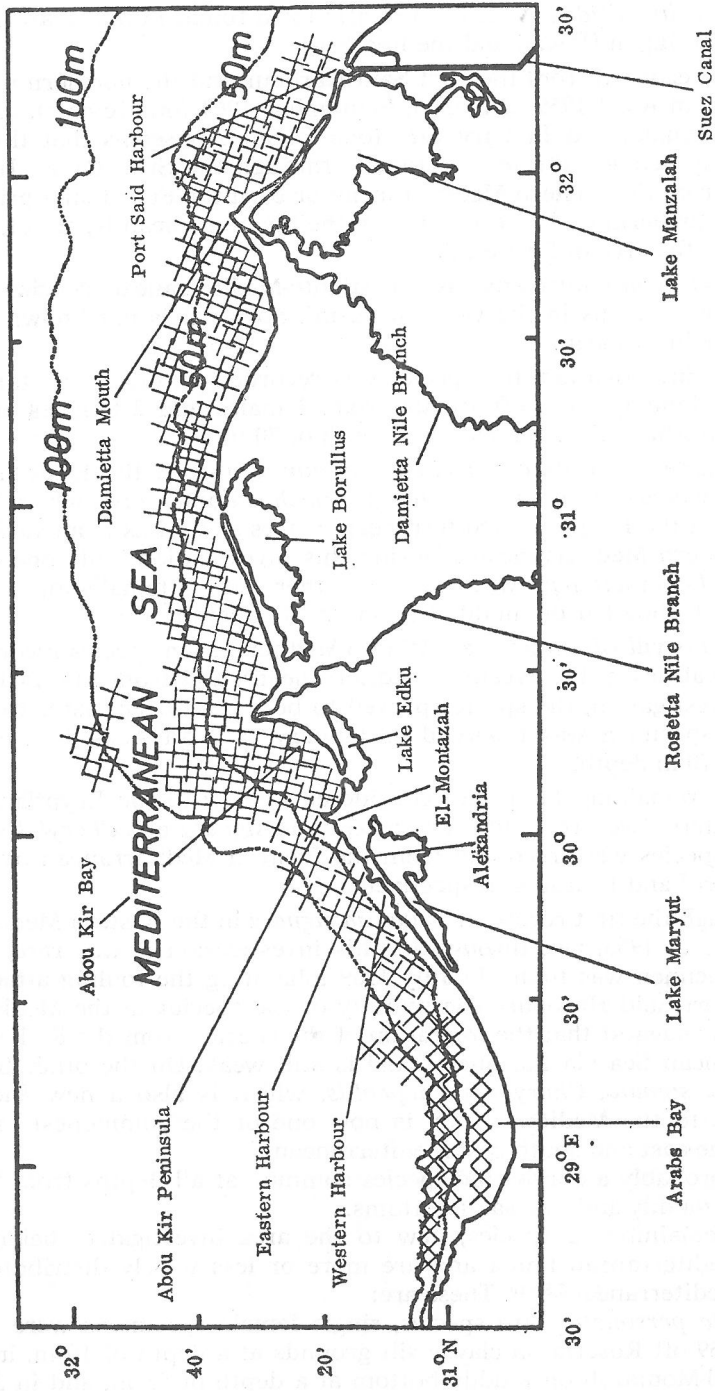


Fig. 1. Chart of investigated area.

*Sphaerozius nitidus* is an Indo-Pacific form found in Madagascar, Borneo Siam, China, Japan Hawaii and the Red Sea<sup>3</sup>.

It was recorded from the Port Said Harbour and the northern part of the Suez Canal in April 1969 (2 males), September 1969 (one female), and March 1970 (one female) and January 1971 (one female). It seems that this species has recently invaded the Mediterranean through the Suez Canal. It was not recorded from the Eastern Mediterranean or even the Suez Canal prior to this record<sup>4,5</sup>. Furthermore its occurrence in the Mediterranean is, as yet, probably confined to the area of Port Said.

*Inachus communissimus* is an Atlanto-Mediterranean species recorded from various regions in the western basin<sup>6</sup>. So far it is not known from the Eastern Mediterranean.

In this investigation, the species was recorded on muddy bottom on two occasions: January 1970, off El-Montazah, 4 males and 2 females at a depth of 55 m; off Abou Kir, 7 females at a depth of 70 m.

The lack of records of *Inachus communissimus* in the Eastern Mediterranean may be due to its confusion with *Inachus dorsettensis* which is already known from the Egyptian Mediterranean waters as well as from various parts of the Eastern Mediterranean<sup>7</sup>. During this investigation, only one ovigerous female of *I. dorsettensis* was found together with 7 females of *I. communissimus* off Abou Kir on muddy bottom at 70 m depth.

*Pilumnus villosissimus* is an Atlanto-Mediterranean species recorded from various localities in the Western Mediterranean<sup>6</sup>, and from the Adriatic Sea<sup>8</sup>. In this investigation, the species proved to be a rare, deep water form; only one male specimen was recorded in January 1970 off Abou Kir, on muddy bottom at 70 m depth.

Of the remaining 14 species considered as new to the Egyptian Mediterranean waters, two are Indo-Pacific; *Leucosia signata* and *Charybdis longicollis*. Both species were recorded from the Eastern Mediterranean by Holthuis and Gottlieb<sup>7</sup> and Holthuis<sup>9</sup> respectively.

Although the first record of *Leucosia signata* in the Eastern Mediterranean dates back to 1953, yet, throughout this investigation it was rare, only one female specimen was found in July 1969 inhabiting the fouling attached to a buoy in Port Said Harbour. The scarcity of the species in the Mediterranean waters may suggest that the migration of the species from the Red Sea to the Mediterranean Sea via the Suez Canal is still weak. On the other hand, contrary to *L. signata*, *Charybdis longicollis*, which is also a new Indo-Pacific immigrant to the Mediterranean, is now one of the commonest nonedible crabs in the east and south east Mediterranean.

It is probably a eurybathic species common at all depths from 8–200 m, mostly on muddy and fine sand bottoms.

The remaining 12 species, new to the area investigated, belong to the Atlanto-Mediterranean fauna and are more or less widely distributed in the eastern Mediterranean<sup>6,8–10</sup>. These are:

*Dromia personata*: rare species, single female specimens were recorded, in May 1969 off Rosetta on clayey silt grounds at a depth of 10 m, in January 1970 off El-Montazah on muddy bottom at a depth of 55 m, and in June 1970 off Abou Kir on muddy bottom at a depth of 50 m.

TABLE I

*Brachyura from the Mediterranean waters of Egypt*

Known origin, local distribution, depth range (m) and type of bottom of the species recorded; (N) = new record to Egyptian Mediterranean waters; (NN) = new record to the Eastern Mediterranean; (NNN) = new record to the Mediterranean Sea; (X) = species known from Egyptian Mediterranean waters but not recorded in this investigation; A. = Atlantic; M. = Mediterranean; I. = Indopacific; W. A. = West of Abou Kir; A. B. = Abou Kir Bay region; R.-p. = the region from Rosetta to Port Said; EU. = eurybathyc zone

	Species	Known origin			Local distribution			Depth range in meters		Type of Bottom	
		A.	M.	I.	W. A.	A. B.	R. p.	< 50	50-200		EU.
	<b>DROMIACEA</b>										
	Family Dromiidae										
(N)	<i>Dromia personata</i> (Linnaeus, 1758)	+	+		+	+	+	+			Clayey silt
	Family Homolidae										
(N)	<i>Homola barbata</i> (Fabricius, 1793)	+	+		+			+			Sandy
	<b>OXYSTOMATA</b>										
	Family Dorippidae										
(N)	<i>Dorippe lanata</i> (Linnaeus, 1767)	+	+		+	+	+			+	Muddy with vegetation
	<i>Ethusa mascarone</i> (Herbst, 1785)	+	+		+	+					Muddy with vegetation
	Family Calappidae										
	<i>Calappa granulata</i> (Linnaeus, 1767)	+	+		+	+	+			+	Muddy
	Family Leucosiidae										
	<i>Myra fugax</i> (Fabricius, 1798)	+	+	+	+	+	+				Sandy, Silty & Muddy
	<i>Itia nucleus</i> (Linnaeus, 1758)	+	+		+	+	+			+	Sandy & silty sand
(N)	<i>Leucosia signata</i> Paulson, 1875			+							Fouling
	Family Pirimelidae										
(X)	<i>Pirimela denticulata</i> (Montagu 1808)	+			+		+			+	Caulerpa grounds





TABLE I (continuation)

	Species	Known origin			Local distribution			Depth range in meters		Type of Bottom	
		A.	M.	I.	W.A.	A.B.	R.p.	< 50	50-200		EU.
(X)	Family Majidae <i>Macropodia tongirostris</i> (Fabricius, 1775) <i>Macropodia rostrata</i> (Linnaeus, 1761)	+	+		+	+		+		+	Sand with algae & Posedonia. Muddy & Sandy with algae and seaweeds
(X)	<i>Inachus dorsettensis</i> (Pennant, 1777)	+	+		+	+				+	Muddy with caulerpa
(N)	<i>Inachus leptochirus</i> (Leach, 1817)	+	+		+	+		++			Fine sand.
(X)	<i>Inachus thoracicus</i> Roux, 1830	+	+		+	+				+	Muddy
(X)	<i>Inachus phalangium</i> (Fabricius, 1775)	+	+		+	+				+	Sandy & stony with caulerpa
(NN)	<i>Inachus communissimus</i> Rizza, 1839	+	+		+	+				+	Muddy
(X)	<i>Achaeus cranchii</i> Leach, 1817	+	+		+	+		+++			Caulerpa grounds
(X)	<i>Acanthonyx lumulatus</i> (Risso, 1816)	+	+		+	+		+++			Sandy with algae
(X)	<i>Pisa tetradon</i> (Pennant, 1777)	+	+		+	+		+++			Stony and sandy with Algae & Seaweeds
	<i>Pisa nodipes</i> Leach, 1815	+	+		+	+				+	Muddy and Seaweeds
(N)	<i>Pisa armata</i> (Laterelle, 1803)	+	+		+	+					Muddy
(N)	<i>Pisa coralline</i> (Risso, 1816)	+	+		+	+				+	Sandy
(N)	<i>Pisa muscosa</i> (Linnaeus, 1758)	+	+		+	+		+		++	Caulerpa
(X)	<i>Eurynome aspera</i> (Pennant, 1777)	+	+		+	+				+	Muddy
(N)	<i>Maja goitiziana</i> Oliveira, 1888	+	+		+	+					Muddy & Silty sand
(N)	<i>Maja verrucosa</i> H. M. Edwards, 1834 <i>Hyastenus hilgendorffi</i> De Man, 1887	+	+		+	+				+	Muddy
				+						+	Fouling and muddy



*Homola barbata*: rare species, probably sublittoral or deep water form, only 2 female specimens were found in June 1969 off Arabs Bay on silty, clayey bottom at a depth of 180 m and 171 m.

*Dorippe lanata*: rather common species particularly in Abou Kir region, less common in other regions. Eurybathic (8—200 m) species prefers silty sand and muddy bottoms.

*Pilumnus spinifer*: very rare species recorded once, one adult male, off Arabs Bay in June 1969 on silty, clayey bottom at a depth of 180 m.

*Parthenope macrochelos*: occurs frequently, in small numbers almost in all seasons in Abou Kir Bay and in Arabs Bay, sublittoral mostly, on muddy bottom at depths from 50—220 m.

*Inachus leptochirus*: very rare species, recorded once — one male specimen — off Arabs Bay in June 1969 on silty, clayey bottom at a depth of 180 m.

*Inachus thoracicus*: rare species recorded twice from the region of Abou Kir, one male in August 1969 at a depth of 200 m and one ovigerous female in January 1970 at a depth of 54—72 m; and recorded once off El-Montazah at a depth of 55 m, one male. All records were on muddy bottom.

*Pisa armata*: rare species, prefers muddy bottom, recorded once off Abou Kir in May 1970 at a depth of 50 m, one female, and recorded twice off Rosetta in June 1970, one female at a depth of 65 m and 3 females — 2 of them were ovigerous — at a depth of 50 m.

*Pisa corallina*: very rare, recorded only once, one carapace, on sandy, rocky substratum at a depth of 12 m in Abou Kir Bay in January 1970.

*Pisa muscosa*: very rare, recorded once, one female, off the eastern Harbour on muddy bottom at about a depth of 70 m in April, 1970.

*Maja goltziana*: rare species, recorded twice; one male in Abou Kir region at a depth of 140 m in August 1969; and one female at a depth of 27 m in May 1970, both on muddy bottom.

*Maja verrucosa*: rare species recorded once off Abou Kir, one male on muddy bottom at a depth of 50 m in May 1970.

## 2 — Horizontal distribution

In the area investigated, the number of species recorded decreased progressively from west to east. The region west of Abou Kir was the richest being inhabited by 41 species, *i. e.* 70% of the total number of species recorded. On the other hand, 35 species constituting about 62% of the total number were recorded from Abou Kir Bay; while only 19 species, *i. e.* 34%, were recorded from the eastern region, *i. e.* between Rosetta and Port Said.

The comparative paucity of the number of species in the eastern region relative to the western region may be explained by one or both of the following:

a — The nature of the bottom; in the western region the bottom is mostly sandy with gravels and in many places covered with rich plant vegetation, thus favoured by many species. In the eastern region, the unsuitable muddy nature of the bottom and the increased rate of sedimentation in front of the Nile Delta, particularly during the Nile flood periods (prior to 1966), may account for the smaller number of species inhabiting this region.

b — Most of the species recorded belong to the Atlantic fauna and in their eastward progress they may be hindered by the gradually increasing high salinity in the Eastern Mediterranean. Moreover the annual drop in salinity, in front of the Nile Delta, caused by the Nile flood during autumn, may be a repellent to several stenohaline species. As a result such species may avoid the shallow water area of this region and may inhabit deeper waters outside the depth sampled in this investigation.

It is of interest to note that the Indo-Pacific species that have immigrated into the area through the Suez Canal are mostly represented in the eastern region where they constitute about 53% of the species recorded in the region. The number of Indo-Pacific species recorded decreases west of Damietta where they constitute about 17% of the population of the brachyuran crabs recorded in the western region. This seems natural since the Indo-Pacific species emerging from the Suez Canal at Port Said are mostly directed eastward following the general water circulation in the Southern Mediterranean.

Of the Indo-Pacific immigrants, 4 species are as yet confined to the area of Port Said Harbour, viz: *Leucosia signata*; *Heteropanope laevis*; *Sphaerozium nitidus* and *Hyastenus hilgendorfi*; only the last mentioned species has extended its range westward where it was found on muddy bottom 30 km west of Port Said at a depth of 7 m. The eastward extension of these species east of Port Said could not be revealed from this study. However, *Hyastenus hilgendorfi* and *Leucosia signata* were recorded in the Eastern Mediterranean respectively by Lewinsohn and Holthuis<sup>10</sup> and Holthuis and Gottlieb<sup>7</sup>.

According to available literature, the occurrence of *Heteropanope laevis* and *Sphaerozium nitidus* in the Mediterranean is, as yet, limited to the area of Port Said.

Except for the last mentioned two species, all the Indo-Pacific species recorded are widely distributed in the south eastern Mediterranean, some of them, *Charybdis longicollis*, *Charybdis hellerii* and *Portunus pelagicus*, are even common.

### 3 — Vertical distribution

Of the species recorded, 13 species, i. e. 23% of the total number, may be regarded as eurybathic being recorded from near the shore to about a depth of 200 m. Several of them were rather common in all three regions sampled. *Macropipus vernalis*, *Charybdis longicollis*, *Dorippe lanata*, *Charybdis hellerii* and *Myra fugax* are among the common species belonging to this category. On the other hand, 30 species, comprising 54%, were mostly confined to the eulittoral zone extending down to a depth of about 50 m. Of these, *Callinectes sapidus* and *Carcinus mediterraneus* are extremely euryhaline, tolerating salinity as low as that of the brackish water Delta Lakes (about 8‰) where they usually abound.

The sublittoral zone extending down to about a depth of 200 m is inhabited by a relatively smaller number of species. Only 13 species were confined to this zone. Of these *Inachus communissimus* and *Parthenope macrochelos* were rather frequent.

The eulittoral zone is therefore more rich in species than the sublittoral zone, and the ratio of the numbers of species recorded in both zones is ap-

proximately 8 : 5. Furthermore most of the Indo-Pacific species recorded in the area were more or less confined to the eulittoral zone. This confirms the general rule that in the Mediterranean, the zone between 0 and 60 m of depth contains more tropical or southern species while the 60—500 m zone contains more northern species<sup>11, 12</sup>.

#### 4 — *Species of economic importance*

Of the species recorded only *Portunus pelagicus* and *Callinectes sapidus* are considered of economic value and are locally commercially exploited. *Portunus pelagicus* is an Indo-Pacific immigrant, recorded at Port Said since 1898<sup>13</sup>. Afterwards it became common along the whole Egyptian coast and further eastward to Haifa, Beirut and the Bay of Alexandretta<sup>1, 9</sup>. However, the occurrence of the species in the Mediterranean is, so far, confined to the eastern basin.

The blue crab *Callinectes sapidus* is of Atlantic origin and widely distributed in the Mediterranean Sea<sup>9</sup>. Its record in Egyptian waters dates back to the year 1940 when it was caught from the brackish water Delta Lakes connected to the Sea<sup>14</sup>.

The occurrence of both species in the area is noteworthy. *Callinectes sapidus* is mostly caught from the brackish water Delta Lakes in direct connection with the sea and rarely obtained from the adjacent marine waters, while *Portunus pelagicus* is mostly caught from the littoral zone along the northern coast of Egypt, particularly from the area east of Alexandria and at depths usually less than 50 m.

Table II shows the total annual catch for both species during the last 10 years according to the statistics of the Institute of Oceanography and Fisheries. Although such statistics are sometimes open to discussion, yet, it shows that:

TABLE II  
*Total annual catch (in tons) of Portunus pelagicus  
and Callinectes sapidus from the north coast  
of Egypt and adjacent lakes*

Year	Catch of <i>Portunus pelagicus</i>	Catch of <i>Callinectes sapidus</i>
1962	39.3	187.4
1963	266.8	639.3
1964	670.8	2413.9
1965	452.9	1723.4
1966	334.5	1821.0
1967	123.0	519.0
1968	245.3	69.8
1969	71.9	12.2
1970	12.4	7.8
1971	149.4	8.0

a — The catch of *Callinectes sapidus* is much greater than that of *Portunus pelagicus*. This may be due to the greater number of fishing boats working in the lakes. Besides, the brackish water environment of the Delta lakes, particularly Lake Manzalah is favourable for the successful propagation of *C. sapidus* which prefers such an environment for completion of its life cycle<sup>14, 15</sup>.

b — The catch of both species particularly *C. sapidus* has decreased drastically since 1967. This is most probably a result of the construction of High Dam and the complete prevention of Nile flood water from reaching the Mediterranean Sea, a condition which greatly affected the productivity of the south eastern Mediterranean and the northern Delta Lakes. Besides, the low population of *Portunus pelagicus* may be due to its competition with other Indo-Pacific immigrants such as *Charybdis longicollis* which is now one of the commonest non-edible crabs in the eastern Mediterranean.

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#### IZVOD

#### Brachyura (Decapoda Crustacea) iz Sredozemnih voda Egipta

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Istraživanjem faune kratkorepih rakova (Crustacea Decapoda, Brachyura) u sredozemnim vodama Egipta utvrđena je 41 vrsta iz 29 rodova. Od nađenih vrsta 17 su nove za to područje, vrsta *Sphaerozius nitidus* Stimpson nova je za Sredozemno more, a *Balumnus villosissimus* (Rafinesque) i *Inachus communissimus* Rizza nove su za istočno Sredozemlje. U radu se pored taksonomskih problema raspravlja i o ekologiji, vertikalnoj i horizontalnoj rasprostranjenosti te o ekonomskoj važnosti nekih vrsta.