

## DECAPOD FAUNA OF THE PIRAN GULF

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### ABSTRACT

Decapods' collections made during faunistic surveys of the Piran Gulf (Northern Adriatic) were examined.

Among the 75 species recorded, 17 are new records for the area. At present more than 90 species are known from the region around the Piran Gulf, but some old records are questionable.

### RIASSUNTO

**I Decapodi del Golfo di Pirano:** - Numerose indagini sul benthos del Golfo di Pirano (Adriatico settentrionale) sono state effettuate negli anni '70. L'esame dei Crostacei Decapodi raccolti ha evidenziato la presenza di 75 specie, 17 non segnalate in precedenza.

Attualmente più di 90 specie sono note per l'area circostante il Golfo di Pirano, ma alcune vecchie segnalazioni sembrano dubbie.

The fauna of the Piran Gulf, 45°32'N, 13°32'E, is of special interest inasmuch as it is on the northernmost part of the Yugoslav coast in the Adriatic Sea, an area in which ecological conditions are relatively unfavorable in comparison with the remainder of the Mediterranean. The Piran Gulf is just south of the major Italian port of Trieste; the shipping lines to Trieste pass near to this part of the Istrian coast. The region not only is polluted but also is strongly influenced by freshwater runoff.

A second reason for studying this fauna is that in the past it was investigated by several workers, and a comparison can be made between the fauna existing there today with that reported in the past. Relatively large amounts of recently collected materials have added much to our knowledge of the fauna. Materials reported here increase the decapod fauna of the area by approximately 30%.

## HISTORY OF INVESTIGATIONS

The decapod Crustacea of the Piran Gulf have been under investigation for over a century. One of the earliest investigators was P. Pius TITIUS, who collected materials from Piran and the adjacent Istrian coast, and sent identified materials from this area to established European museum, including the Zoologisches Staatssammlung in Munich and Naturhistorisches Museum in Vienna. TITIUS apparently published nothing on his collection, at least some of which was studied by HELLER (1863). Additional records of decapods from the Piran area were given in later works by STALIO (1877), STOSSICH (1880), GRAEFFE (1902), and PESTA (1918).

The relatively large amount of information available on the fauna of the Piran Gulf probably stems from the fact that a marine biological station was established at nearby Trieste in 1875. As a result of earlier investigations, more than 90 species had been recorded from the Piran Gulf.

After foundation of the Marine Biological Station at Portorož in 1962, several surveys of the Piran Gulf were carried out in 1965, 1968, and 1970-71, resulting in the accumulation of relatively rich collection of decapods (AVČIN et al. 1974; MATJASIČ et al. 1975).

## MATERIAL

Much of the material reported here was collected from sublittoral habitats in the Piran Gulf by divers carrying out basic faunal surveys. Some material is available from trawl surveys. In 1973 one of us (RBM) visited the Marine Biological Station at Portorož and made collections from littoral habits in the area (RBM Yugo stations). In these collections material of callianassids and upogebiids was collected in shallow water with a yabby pump, a technique reported on by MANNING (1975).

Representative collections have been deposited at the Marine Biological Station, Portorož, the Center for Marine Research, "Rudjer Bošković" Institute, Rovinj, and the National Museum of Natural History, Smithsonian Institution, Washington. These repositories are identified in the sections on material, below, by the initials P (Portorož), R (Rovinj), and W (Smithsonian).

## INVESTIGATED AREA

Materials reported here were collected in the region of the Piran Gulf from localities between Point of Savudrija to Koper, near the Italian border.

RANKE (1976) has summarized hydrological conditions and has given a detailed analysis of the sediments of the Piran Gulf.

The following localities in the area around Piran are mentioned in the text:

Fra Giacomo [Fra Jakomo] [shoal]: 45°30'N, 13°29'E. - Izola [Isola]: 45°32'N, 13°40'E. - Kanegra: 45°29'N, 13°24'E. - Koper: 45°33'N, 13°34'E. - Piran: 45°33'N, 13°34'E. - Piranski zaliv [Piran Gulf]: 45°32'N, 13°32'E. - Portorož:

45°31'N, 13°36'E. - Roněk [Ronko] Point: 45°32'N, 13°37'E. - Savudrija [point]: 45°29'N, 13°31'E. - Savudrijska obala (= Savudrija coast). - Strunjan: 45°32'N, 13°37'E. - Strunjaski potok [stream]: 45°32'N, 13°36'E. - Umag: 45°25'N, 13°32'E.

### SAMPLING PROGRAMS AND SPECIES COLLECTED

Part of the material was collected at 7 coastal transects (B1 — B7) within the Gulf of Piran. At each transect for each depth 1 square was taken at the following depths:

- Q1 - Supralittoral, 1-2 m. above H.W.S.T.
- Q2 - Upper mediolittoral, ± 20 cm. of H.W.S.T.
- Q3 - Lower mediolittoral, ± 20 cm. of L.W.S.T.
- Q4 - Upper infralittoral, 0.5 m. depth (below average 0 m.)
- Q5 - Infralittoral, depth 1-2 m.
- Q6 - Infralittoral, depth 2-3 m.
- Q7 - Infralittoral, depth 3-4 m.
- Q8 - Infralittoral, depth 4-5 m.
- Q9 - Infralittoral, depth 5-6 m.
- Q10 - Infralittoral, depth 7-8 m.
- Q11 - Infralittoral, depth 9-10 m.

In principle at each station and at each depth collecting was repeated seven times during 1965, for various seasons, during January, March, April, May, June, October and November.

We have listed below the species collected at each station, in order to provide an idea of species associates in each locality, by depth. This is followed by a list of species arranged in systematic order. In that list we have followed the classification and arrangement of families given in ZARIQUIEY ALVAREZ (1968). Name changes in the more recent literature (HOLTHUIS 1977, INGLE 1980, MANNING & HOLTHUIS 1981) have been followed here.

The following decapods were taken at these stations:

- |                |            |  |
|----------------|------------|--|
| <b>BI Q1 :</b> | 11.I.65,   | 1 + m.: <i>Thorulus cranchii</i> , <i>Achaeus cranchii</i> .                                 |
| <b>BI Q7 :</b> | 2.VI.65,   | 3 m.: <i>Cestopagurus timidus</i> , <i>Pagurus anachoretus</i> .                             |
| <b>BI Q8 :</b> | 11.I.65,   | 4 m.: <i>Alpheus dentipes</i> , <i>Pagurus anachoretus</i> .                                 |
| <b>BI Q9 :</b> | 11.I.65,   | 5 m.: <i>Pilumnus spinifer</i> .   |
|                | 11.I.65,   | 7 m.: <i>Galathea squamifera</i> .   |
|                | 30.III.65, | 5 m.: <i>Alpheus dentipes</i> , <i>Pagurus anachoretus</i> ,<br><i>Macropodia rostrata</i> . |
| <b>BI Q10:</b> | 11.I.65,   | 7 m.: <i>Galathea cenarroi</i> .   |
|                | 30.III.65, | 7 m.: <i>Pisidia longimana</i> .   |
| <b>B2 Q3 :</b> | 26.IV.65,  | 0 m.: <i>Alpheus dentipes</i> .  |
| <b>B2 Q5 :</b> | 13.I.65,   | 1 m.: <i>Acanthonyx lunulatus</i> .  |
| <b>B2 Q6 :</b> | 13.I.65,   | 2 m.: <i>Galathea bolivari</i> , <i>Pisa muscosa</i> , <i>P. nodipes</i> .                   |
|                | 8.X.65,    | 2 m.: <i>Thorulus cranchii</i> , <i>Pagurus anachoretus</i> .                                |
| <b>B2 Q7 :</b> | 2.IV.65,   | 3 m.: <i>Alpheus dentipes</i> , <i>Pisidia bluteli</i> .                                     |

<b>B2 Q7 :</b>	25.V.65,	3 m.: <i>Cestopagurus timidus</i> , <i>Pagurus anachoretus</i> , <i>Galathea bolivari</i> , <i>Pisidia longimana</i> .
<b>B2 Q8 :</b>	13.I.65,	4 m.: <i>Pagurus anachoretus</i> .
	6.IV.65,	4 m.: <i>Pisidia longimana</i> .
	6.IV.65,	5 m.: <i>Pagurus cuanensis</i> .
	26.V.65,	4 m.: <i>Alpheus dentipes</i> , <i>Cestopagurus timidus</i> .
<b>B3 Q4 :</b>	20.I.65,	0.5 m.: <i>Liocarcinus arcuatus</i> .
<b>B3 Q6 :</b>	20.I.65,	2 m.: <i>Palaemon elegans</i> .
<b>B3 Q6 :</b>	27.IV.65,	2 m.: <i>Diogenes pugilator</i> .
<b>B3 Q8 :</b>	20.I.65,	4-5.: <i>Pisidia longimana</i> .
	27.IV.65,	4 m.: <i>Hippolyte inermis</i> , <i>H. longirostris</i> , <i>Pagurus anachoretus</i> , <i>P. cuanensis</i> .
<b>B3 Q9 :</b>	20.I.65,	4 m.: <i>Pagurus anachoretus</i> .
	20.I.65,	5 m.: <i>Macropodia longirostris</i> .
	26.I.65,	5 m.: <i>Carcinus aestuarii</i> .
	11.VI.65,	5 m.: <i>Diogenes pugilator</i> .
<b>B4 Q2 :</b>	22.I.65,	0 m.: <i>Macropodia longirostris</i> .
<b>B4 Q6 :</b>	22.I.65,	2 m.: <i>Pagurus anachoretus</i> , <i>Pisidia bluteli</i> , <i>Sirpus zariquiei</i> .
<b>B4 Q8 :</b>	22.I.65,	4 m.: <i>Pagurus anachoretus</i> .
	22.I.65,	5 m.: <i>Galathea intermedia</i> , <i>Pisidia bluteli</i> .
<b>B4 Q9 :</b>	22.I.65,	5-6 m.: <i>Thorulus cranchii</i> .
	22.I.65,	5 m.: <i>Processa edulis edulis</i> , <i>Pagurus cuanensis</i> , <i>Galathea bolivari</i> , <i>Pisidia bluteli</i> , <i>Pilumnus spinifer</i> , <i>Achaeus cranchii</i> .
	19.X.65,	5 m.: <i>Cestopagurus timidus</i> .
	22.XI.65,	5-6 m.: <i>Athanas nitescens</i> .
<b>B4 Q10:</b>	19.X.65,	7 m.: <i>Thorulus cranchii</i> , <i>Athanas nitescens</i> , <i>Pisidia bluteli</i> .
<b>B5 Q6 :</b>	26.I.65,	2 m.: <i>Pagurus anachoretus</i> .
<b>B5 Q7 :</b>	26.I.65,	3 m.: <i>Pagurus anachoretus</i> , <i>Pisidia bluteli</i> , <i>Pisa tetraodon</i> .
<b>B5 Q8 :</b>	26.I.65,	4 m.: <i>Alpheus dentipes</i> , <i>Cestopagurus timidus</i> , <i>Pisidia bluteli</i> .
<b>B5 Q9 :</b>	26.I.65,	4 m.: <i>Pilumnus aestuarii</i> .
	18.VI.65,	5 m.: <i>Alpheus dentipes</i> , <i>Pisidia bluteli</i> .
<b>B5 Q11:</b>	18.VI.65,	10 m.: <i>Upogebia tipica</i> .
<b>B6 Q3 :</b>	29.VI.65,	0 m.: <i>Palaemon elegans</i> .
<b>B6 Q10:</b>	11.I.65,	7 m.: <i>Thorulus cranchii</i> .
	20.IV.65,	7 m.: <i>Pisidia bluteli</i> .
	29.IV.65,	7 m.: <i>Athanas nitescens</i> .
	29.VI.65,	7 m.: <i>Pagurus anachoretus</i> .
<b>B7 Q11:</b>	11.XI.65,	10 m.: <i>Pisidia bluteli</i> .

Decapod associations in the Piran Gulf, based on 1965 survey. (Number of occurrences in parentheses. Those listed without numbers occurred once).

- Q1 level, Supralittoral, 1-2 m. above HWST: *Thoralus cranchii*, *Achaeus cranchii*.  
 Q2 level, Upper mediolittoral,  $\pm$  20 cm. of HWST: *Macropodia longirostris*.  
 Q3 level, Lower mediolittoral,  $\pm$  20 cm. of LWST: *Alpheus dentipes*, *Palaemon elegans*.  
 Q4 level, Upper infralittoral, 0.5 m. depth (below average 0 m.): *Liocarcinus arcuatus*.  
 Q5 level, Infralittoral, 1-2 m.: *Acanthonyx lunulatus*.  
 Q6 level, Infralittoral, 2-4 m.: *Thoralus cranchii*, *Palaemon elegans*, *Diogenes pugilator*, *Pagurus anachoretus* (3), *Galathea bolivari*, *Pisidia bluteli*, *Sirpus zariquieyi*, *Pisa muscosa*, *P. nodipes*.  
 Q7 level, Infralittoral, 3-4 m.: *Alpheus dentipes*, *Cestopagurus timidus* (2), *Pagurus anachoretus* (3), *Galathea bolivari*, *Pisidia bluteli* (2), *P. longimana*, *Pisa tetraodon*.  
 Q8 level, Infralittoral, 4-5 m.: *Hippolyte inermis*, *H. longirostris*, *Alpheus dentipes* (3), *Cestopagurus timidus* (2), *Pagurus anachoretus* (4), *P. cuanensis* (2), *Galathea intermedia*, *Pisidia bluteli* (2), *P. longimana* (2).  
 Q9 level, Infralittoral, 5-6 m.: *Thoralus cranchii*, *Alpheus dentipes* (2), *Athanas nitescens*, *Processa edulis edulis*, *Diogenes pugilator*, *Cestopagurus timidus*, *Pagurus anachoretus* (2), *P. cuanensis*, *Galathea bolivari*, *G. squamifera*, *Pisidia bluteli*, *Carcinus aestuarii*, *Pilumnus aestuarii*, *P. spinifer* (2), *Achaeus cranchii*, *Macropodia longirostris*, *M. rostrata*.  
 Q10 level, Infralittoral, 7-8 m.: *Thoralus cranchii* (2), *Athanas nitescens* (2), *Anapagurus sp.*, *Pagurus anachoretus*, *Galathea cenarroi*, *Pisidia bluteli* (2), *P. longimana*.  
 Q11 level, Infralittoral, 9-10 m.: *Upogebia tipica*, *Pisidia bluteli*.

The following stations were sampled with a standard Van Veen grab over a period of several years. The list of station numbers with coordinates is followed by a list of species taken at each station. Station NA-PI-1A and NA-PI-2A were made by dredge in a depth of about 22 m. at approximately 13°33'W and 13°32'W.

Station	Depth	Coordinates	
NA-PI 2	5.0 m.	13°35'17''E	45°29' 8''N
NA-PI 3	6.0 m.	13°35'27''E	45°29'28''N
NA-PI 4	2.0 m.	13°35'15''E	45°29'47''N
NA-PI 5	3.0 m.	13°35'24''E	45°30'11''N
NA-PI 5a	2.5 m.	13°35'44''E	45°30'17''N
NA-PI 6a	2.5 m.	13°35'44''E	45°30'28''N
NA-PI 7	10.0 m.	13°35'22''E	45°30'32''N
NA-PI 8	7.0 m.	13°35'23''E	45°30'47''N
NA-PI 8a	2.5 m.	13°35'47''E	45°30'45''N

Station	Depth	Coordinates	
NA-PI 9	8.5 m.	13°34'50"E	45°30'53"N
NA-PI 10	12.5 m.	13°34'51"E	45°30'32"N
NA-PI 11	12.0 m.	13°34'51"E	45°30'10"N
NA-PI 12	12.0 m.	13°34'51"E	45°29'49"N
NA-PI 13	12.5 m.	13°34'52"E	45°29'22"N
NA-PI 14	4.0 m.	13°34'50"E	45°29' 2"N
NA-PI 15	2.5 m.	13°35' 0"E	45°28'53"N
NA-PI 17	5.0 m.	13°34'20"E	45°29' 6"N
NA-PI 18	15.0 m.	13°34'16"E	45°29'28"N
NA-PI 19	12.0 m.	13°34'20"E	45°29'49"N
NA-PI 20	15.5 m.	13°34'22"E	45°30' 7"N
NA-PI 21	16.0 m.	13°34'20"E	45°30'27"N
NA-PI 22	16.0 m.	13°34'19"E	45°30'53"N
NA-PI 23	13.5 m.	13°34'10"E	45°31'13"N
NA-PI 25	31.0 m.	13°33'47"E	45°31'57"N
NA-PI 26	19.5 m.	13°33'47"E	45°31'35"N
NA-PI 27	17.5 m.	13°33'48"E	45°31'14"N
NA-PI 28	16.5 m.	13°33'48"E	45°30'53"N
NA-PI 29	17.0 m.	13°33' 5"E	45°30'30"N
NA-PI 30	17.0 m.	13°33'21"E	45°30'13"N
NA-PI 31	16.5 m.	13°33'49"E	45°29'55"N
NA-PI 32	14.0 m.	13°32'47"E	45°29'32"N
NA-PI 33	4.0 m.	13°34'41"E	45°29'11"N
NA-PI 34	7.0 m.	13°33'21"E	45°29'23"N
NA-PI 35	17.0 m.	13°33'19"E	45°29'51"N
NA-PI 36	17.0 m.	13°33'21"E	45°30'10"N
NA-PI 37	17.0 m.	13°33'24"E	45°30'32"N
NA-PI 38	17.0 m.	13°33'19"E	45°30'53"N
NA-PI 39	18.0 m.	13°33'15"E	45°31'14"N
NA-PI 40	24.0 m.	13°33'13"E	45°31'34"N
NA-PI 41	23.0 m.	13°33'16"E	45°31'56"N
NA-PI 42	22.5 m.	13°32'46"E	45°31'35"N
NA-PI 43	20.0 m.	13°32'37"E	45°31'11"N
NA-PI 44	18.5 m.	13°32'47"E	45°30'56"N
NA-PI 45	17.5 m.	13°32'47"E	45°30'32"N
NA-PI 46	17.5 m.	13°32'46"E	45°30'10"N
NA-PI 47	16.5 m.	13°32'47"E	45°29'49"N
NA-PI 49	12.0 m.	13°32'17"E	45°29'52"N

Station	Depth	Coordinates	
NA-PI 50	18.5 m.	13°32'16''E	45°30'10''N
NA-PI 51	18.5 m.	13°32'16''E	45°30'31''N
NA-PI 52	19.0 m.	13°32'17''E	45°30'52''N
NA-PI 53	20.5 m.	13°32' 7''E	45°31'11''N
NA-PI 54	21.5 m.	13°31'38''E	45°30'54''N
NA-PI 55	20.0 m.	13°31'45''E	45°30'32''N
NA-PI 56	20.5 m.	13°31'45''E	45°30'41''N
NA-PI 58	13.0 m.	13°31'45''E	45°30' 9''N
NA-PI 59	21.0 m.	13°31'18''E	45°30'27''N
NA-PI 60	20.0 m.	13°30'45''E	45°30'17''N

List of species taken during Piran Gulf Survey (NA-PI stations)

**NA-PI-1A:** *Thorulus cranchii*, *Athanas nitescens*, *Crangon crangon*, *Pagurus cuanensis*, *Eurynome aspera*, *Inachus thoracicus*, *Macropodia rostrata*.

**NA-PI-2:** *Processa modica carolii*.

**NA-PI-2A:** *Thorulus cranchii*, *Athanas nitescens*, *Processa edulis edulis*, *Pontophilus fasciatus*, *Ethusa mascarone*, *Pinnotheres pisum*, *Macropodia linaresi*, *M. rostrata*, *Pisa nodipes*.

**NA-PI-3:** *Inachus dorsettensis*.

**NA-PI-5a:** *Gouretia minor*.

**NA-PI-6a:** *Hippolyte longirostris*.

**NA-PI-8a:** *Hippolyte longirostris*.

**NA-PI-10:** *Hippolyte longirostris*, *Processa modica carolii*.

**NA-PI-11:** *Processa modica carolii*.

**NA-PI-14:** *Athanas nitescens*, *Processa edulis edulis*, *P. modica carolii*.

**NA-PI-15:** *Thorulus cranchii*, *Pontophilus monacanthus*.

**NA-PI-17:** *Pontophilus monacanthus*.

**NA-PI-23:** *Paguristes oculatus*, *Pagurus anachoretus*, *Liocarcinus arcuatus*, *Pilumnus spinifer*.

**NA-PI-25:** *Alpheus dentipes*, *A. macrocheles*, *Synalpheus gambarelloides*, *Paguristes oculatus*, *Pisidia longimana*, *Pilumnus spinifer*, *Pinnotheres pinnotheres*, *Eurynome aspera*.

**NA-PI-26:** *Upogebia pusilla*, *Diogenes pugilator*, *Anapagurus bicorniger*, *Pagurus anachoretus*, *P. cuanensis*, *Dromia personata*, *Ethusa mascarone*, *Liocarcinus maculatus*, *Pinnotheres pinnotheres*.

**NA-PI-27:** *Galathea intermedia*, *Pisidia longimana*, *Pilumnus spinifer*.

**NA-PI-28:** *Processa modica carolii*.

**NA-PI-29:** *Thorulus cranchii*, *Athanas nitescens*, *Pontophilus monacanthus*, *Pisidia longimana*, *Pilumnus spinifer*.

**NA-PI-31:** *Alpheus glaber*, *Athanas nitescens*.

**NA-PI-33:** *Paguristes oculatus*.

- NA-PI-34:** *Pontophilus monacanthus*, *Gourettia minor*, *Liocarcinus depurator*  
**NA-PI-36:** *Thoralus cranchii*, *Pontophilus monacanthus*.  
**NA-PI-37:** *Pontophilus monacanthus*.  
**NA-PI-41:** *Thoralus cranchii*, *Pontophilus monacanthus*.  
**NA-PI-42:** *Pontophilus monacanthus*.  
**NA-PI-43:** *Hippolyte holthuisi*, *Thoralus cranchii*, *Athanas nitescens*, *Galathea intermedia*, *Pisidia longimana*.  
**NA-PI-45:** *Jaxea nocturna*.  
**NA-PI-49:** *Sicyonia carinata*, *Processa modica caroli*, *Galathea intermedia*, *Pisidia longimana*.  
**NA-PI-52:** *Thoralus cranchii*, *Pontophilus monacanthus*.  
**NA-PI-53:** *Pisidia longimana*.  
**NA-PI-54:** *Paguristes oculatus*, *Galathea intermedia*.  
**NA-PI-57:** *Athanas nitescens*.  
**NA-PI-58:** *Alpheus glaber*, *Galathea intermedia*.  
**NA-PI-96:** *Paguristes oculatus*, *Eurynome aspera*.  
**NA-PI-97:** *Thoralus cranchii*, *Athanas nitescens*, *Processa modica caroli*.  
**NA-PI-98:** *Thoralus cranchii*, *Gourettia minor*.  
**NA-PI-99:** *Gourettia minor*.  
**NA-KO-1:** *Pisidia longimana*.  
**NA-KO-2:** *Pontophilus monacanthus*.  
**NA-KO-6:** *Upogebia tipica*.  
**NA-PI-PO:** *Maja squinado*.  
**NA-Ronek:** *Pagurus cuanensis*, *Inachus communissimus*.  
**NA-PI-Fra Giacomo:** *Macropodia longirostris*.  
**NA-Umag:** *Liocarcinus depurator*, *Inachus thoracicus*.  
**NA-Piran:** *Paguristes oculatus*, *Pagurus prideaux*, *Galathea strigosa*, *Dromia personata*, *Eriphia verrucosa*, *Parthenope angulifrons*, *Maja squinado*, *Pisa corallina*.  
**St. 5:** *Alpheus glaber*.  
**St. 7:** *Ebalia edwardsi*.  
**NA-ST-8B:** *Diogenes pugilator*.  
**Savudrijska obala:** *Palaemon elegans*, *Clibanarius erythropus*, *Pisidia longimana*, *Porcellana platycheles*, *Dromia personata*, *Pilumnus spinifer*, *Xantho poressa*, *Parthenope angulifrons*, *Pisa nodipes*.

Decapoda Collected Sublittorally During General Survey of Piran Gulf, 1968.

**Piran Gulf**, 5.X-1.XII.68, 5-18 m.: *Alpheus dentipes*, *Palaemon elegans*, *Galathea squamifera*, *G. strigosa*, *Pisidia longimana*, *Dromia personata*, *Ethusa mascarone*, *Ilia nucleus*, *Eriphia verrucosa*, *Pilumnus spinifer*, *Xantho poressa*, *Goneplax rhomboides*, *Macropodia rostrata*, *Maja crispata*, *Pisa nodipes*.

Station data and species list, R.B. MANNING collection in Piran area, Yugoslavia, March 1973.

**RMB Yugo-1:** Side road between km. markers 5 and 6 on Savudrija (Salvore) road, at Kanegra, along rocky shore adjacent to quarry. Hand and dipnet. RBM, Barbara Ann Manning. 17 March 1973. Crabs and porcellanids from under rocks in interti-



dal zone. Species: *Palaemon elegans*, *Porcellana platycheles*, *Pisidia bluteli*, *Xantho poressa*.

**RBM Yugo-2:** At end of side road between km. markers 11 and 12 on Savudrija (Salvore) road, in tidepools. Hand and dipnet. RBM, Barbara Ann Manning. 17 March 1973. Species: *Hippolyte leptocerus*, *H. longirostris*, *Thorulus cranchii*, *Athanas nitescens*, *Palaemon elegans*, *Pisidia longimana*.

**RBM Yugo-4:** Strunjan, between Piran and Izola, tidal channel draining mud flat near public salt ponds. Some exposed rocks on flat, shrimp around and small crabs under rocks. Yabby pump, hand, dipnet. RBM, Barbara Ann Manning. 18 March 1973. Species: *Athanas nitescens*, *Palaemon adspersus*, *P. elegans*, *Upogebia pusilla*, *Diogenes pugilator*, *Pisidia bluteli*, *Porcellana platycheles*, *Carcinus aestuarii*, *Xantho poressa*, *Brachynotus sexdentatus*.

**RBM Yugo-5:** Strunjan, between Piran and Izola. Sand flats outside of salt ponds; sand or sandy mud with some scattered grass, some rocks. Hand and yabby pump. RBM, Barbara Ann Manning. 18 March 1973. Species: *Hippolyte longirostris*, *Athanas nitescens*, *Palaemon adspersus*, *P. elegans*, *Callianassa pestae*, *C. tyrrhena*, *Diogenes pugilator*.

**RBM-Yugo-6:** Strunjan, between Piran and Izola. Sand flat outside of salt ponds; sand and sandy mud with sparse *Zostera*. Hand and yabby pump. RBM. 19 March 1973. Species: *Upogebia pusilla*, *Carcinus aestuarii*, *Macropodia rostrata*.

**RBM Yugo-7:** Strunjan, between Piran and Izola. Saltwater pond connected to sea by tidal channel (channel was Yugo-4). Soft mud, *Zostera*, and much algae; depth about 10 cm. Dipnet. RBM. 19 March 1973. Species: *Hippolyte longirostris*, *Palaemon adspersus*.

**RBM Yugo-8:** Portorož, in front of Grand Palace Hotel. Shallow marl bank. Yabby pump. RBM and C. Froglija. 20 March 1973. Species: *Upogebia pusilla*, *Carcinus aestuarii*, *Pachygrapsus marmoratus*.

**RBM Yugo-12:** Strunjan, between Piran and Izola. Sand flat outside of salt flat, sparse *Zostera* on sand. Dipnet and yabby pump. RBM 22 March 1973. Species: *Hippolyte longirostris*, *Palaemon adspersus*, *P. elegans*, *Callianassa pestae*, *C. tyrrhena*, *Upogebia pusilla*, *Diogenes pugilator*, *Carcinus aestuarii*.

## SYSTEMATIC LIST

### Family Penaeidae

*Sicyonia carinata* Brünnich 1768): - NA-PI-49, 12 m.: 1 (P).

### Family Hippolytidae

*Hippolyte holthuisi* Zariquiey Alvarez 1953: - NA-PI-43, 20 m.: 1 (P).

*Hippolyte inermis* Leach 1815: - B3 Q8, 4 m.: 2 (P).

*Hippolyte leptocerus* Heller 1863: - RBM Yugo-2, tidepools: 16 (P,W).

Remarks. — This is the first record of this species from the Piran area; the species has only recently been recorded from Venice (GIORDANI SOIKA, 1948) and that was its first record from the Adriatic, as pointed out by ŠTEVČIĆ (1976: 101). It may well have been confused with other species of *Hippolyte* by earlier

workers. It and *Palaemon serratus* were the most common shrimp in tidepools at Sta. RBM Yugo-2 on the southern border of the Piran Gulf.

*Hippolyte longirostris* (Czerniavsky 1868): - NA-PI-6A, 2.5 m.: 1 (P). — NA-PI-8A, 2.5 m.: 10 (P). — NA-PI-10, 12.5 m.: 3 (P). — B3 Q8, 4 m.: 1 (R). — Strunjan: 36 (P,W). — RBM Yugo-2, tidepools: 2 (W). — RBM Yugo-5, tidal flat: 1 (W). — RBM Yugo-7, salt water pond: 10+(W). — RBM Yugo-12, tidal flat: 2 (W).

Remarks. — This species occurs in three distinct color phases in the Strunjan area. Of the 36 specimens listed above from Strunjan, 26 were green, 8 were red, and 2 were white or clear.

*Thorulus cranchii* (Leach 1817): NA-PI-1A, ca. 22 m.: - 5 (P,W). — NA-PI-2A, ca. 22 m.: 24 (W). — NA-PI-15, 2.5 m.: 1 (P). — NA-PI-29, 17 m.: 10 (P). — NA-PI-36, 17 m.: 1 (P). — NA-PI-41, 23 m.: 2 (W). — NA-PI-43, 20 m.: 7 (P). — NA-PI-52, 19 m.: 7 (P). — NA-PI-97: 2 (P). — NA-PI-98: 2 (P). — B1 Q1, 1+m.: 1 (R). — B2 Q6, 2 m.: 1 (R). — B4 Q9, 5-6 m.: 2 (R). — B4 Q10, 7 m.: 1 (R). — B6 Q10, 7 m.: 1 (R). — RBM Yugo-2, tidepools: 1 (W).

#### Family Alpheidae

*Alpheus dentipes* Guérin 1832: - NA-PI-25, 31 m.: 32 (P,W). — B1 Q8, 4 m.: 3 (R). — B1 Q9, 5 m.: 1 (R). — B2 Q3, 0 m.: 1 (R). — B2 Q7, 3 m.: 1 (R). — B2 Q8, 4 m.: 1 (R). — B5 Q8, 4 m.: 2 (R). — B5 Q9, 5 m.: 1 (R). — Piran Gulf, 5-18 m.: 4 (R).

*Alpheus glaber* (Olivi 1792): - NA-PI-31, 16.5 m.: 1 (P). — NA-PI-58, 13 m.: 1 (W). — St. 5, 3 m.: 1 (P).

*Alpheus macrocheles* (Hailstone 1835): - NA-PI-25, 31 m.: 1 (P).

*Athanas nitescens* (Leach 1814): - NA-PI-1A, ca. 22 m.: 1 (P). — NA-PI-2A, ca. 22 m.: 11 (P,W). — NA-PI-14, 4 m.: 2 (P). — NA-PI-29, 17 m.: 19 (P). — NA-PI-31, 16.5 m.: 1 (P). — NA-PI-43, 20 m.: 10 (W). — NA-PI-57: 7 (P). — NA-PI-97: 4 (P). — B4 Q9, 5-6 m.: 1 (R). — B4 Q10, 7 m.: 2 (R). — B6 Q10, 7 m.: 1 (R). — RBM Yugo-2, tidepools: 4 (W). — RBM Yugo-4, tidal flat: 1 (W). — RBM Yugo-5, tidal flat: 1 (W).

*Synalpheus gambarelloides* (Nardo 1847): - NA-PI-25, 31 m.: 9 (P,W).

#### Family Processidae

*Processa edulis edulis* (Risso 1816): - NA-PI-2A, ca. 22 m.: 4 (P,W). — NA-PI-14, 4 m.: 1 (P). — B4 Q9, 5 m.: 1 (R).

Remarks. — This subspecies has not been recorded previously from the Piran Gulf. Like *P. modica carolii*, below, it may well have been confused in the past with what are now known to have been composite species. Material of this species probably has been included in early references to *P. canaliculata* Leach 1815 (= *P. mediterranea* Parisi 1915, see AL-ADHUB and WILLIAMSON 1975). Distinctions between European species of *Processa* have only recently been made (NOUVEL & HOLTHUIS 1957).

*Processa modica carolii* Williamson & Rochanaburanon 1979: - NA-PI-2, 5 m.: 2 (P). — NA-PI-10, 12.5 m.: 1 (P). — NA-PI-11, 12 m.: 3 (P). — NA-PI-14, 4 m.: 2 (P). — NA-PI-28, 16.5 m.: 1 (P). — NA-PI-49, 12 m.: 5 (W). — NA-PI-97: 1 (P).

Remarks. — This subspecies, previously identified with *Processa parva* Holthuis 1951, has not been recorded previously from the northern Adriatic. Only

recently it was recorded from around Rovinj, that being the first Adriatic record (ŠTEVČIĆ 1976). WILLIAMSON & ROCHANABURANON (1979: 21) recorded it from several localities between Mersin, Turkey, and Cadaques, Spain.

#### Family Palaemonidae

*Palaemon adpersus* Rathke 1837: - Strunjan: 1 (P). — Strunjanski potok 6: 2 (P). — RBM Yugo-4, tidal flat: 11 (W). — RBM Yugo-5, tidal flat: 2 (W). — RBM Yugo-7, saltwater pond: 2 (W). — RBM Yugo-12, tidal flat: 8 (W).

*Palaemon elegans* Rathke 1837: Savudrijska obala: 1 (P). — B3 Q6, 2 m.: 1 (R). — B6 Q3, 0 m.: 1 (R). — Piran Gulf, 5-18 m.: 8 (R). — RBM Yugo-1, rocky shore: 9 (P,W). — RBM Yugo-2, tidepools: 15 (P,W). — RBM Yugo-4, tidal flat: 10 (W). — RBM Yugo-5, tidal flat: 3 (W). — RBM Yugo-12: 10 (W).

*Palaemon xiphias* (Risso 1816): - Strunjanski potok 6: 2 (P).

#### Family Crangonidae

*Crangon crangon* (Linnaeus 1758): - NA-PI-1A, ca. 22 m.: 1 (P).

*Pontophilus fasciatus* (Risso 1816): - NA-PI-2A, ca. 22 m.: 1 (P).

*Pontophilus monacanthus* Holthuis 1961: - NA-PI-15, 2.5 m.: 1 (W). — NA-PI-17, 5 m.: 1 (W). — NA-PI-29, 17 m.: 1 (W). — NA-PI-34, 7 m.: 1 (P). — NA-PI-36, 17 m.: 1 (P). — NA-PI-37, 17 m.: 1 (W). — NA-PI-41, 23 m.: 1 (W). — NA-PI-42, 22.5 m.: 1 (W). — NA-PI-52, 19 m.: 3 (W). — NA-KO-2: 2 (P).

Remarks. — This species has not previously been recorded from the northern Adriatic. Described in 1961, it has recently been reported from localities in the central Adriatic (FROGLIA 1976).

#### Family Laomediidae

*Jaxea nocturna* Nardo 1847: - NA-PI-45, 17.5 m.: 1 (P).

#### Family Callianassidae

*Callianassa pestae* De Man 1928 [= *Callianassa pontica* Czerniavsky 1884]: RBM Yugo-5, tidal flat: 4 (W). — RBM Yugo-12, tidal flat: 4 (P,W).

Remarks. — Although DE SAINT LAURENT & BOŽIĆ (1976) applied the name *Callianassa pontica* Czerniavsky, 1884, to this species, the specific epithet *pontica* was used by CZERNIAVSKY as an infrasubspecific category (forma). According to Article 10b of the International Code of Zoological Nomenclature, the epithet must be attributed to the first author who elevates it to specific status; the name *C. pontica* must be attributed to V.V. MAKAROV, who in 1938 used the combination *Callianassa pontica*. An older name was employed by J.G. DE MAN, who in 1928 named *Callianassa pestae* and dedicated it to O. Pesta, the Viennese carcinologist. DE MAN (1928: 37) noted that the species occurred at Piran.

Several of the specimens from RBM Sta. 5 were accompanied by copepod associates, each crimson red with a scarlet center. They were identified by Thomas E. BOWMAN, Smithsonian Institution, as *Clausidium apodiforme* (Philippi).

*Callianassa tyrrhena* (Petagna 1792): RBM Yugo-5, tidal flat: 1 (W). — RBM Yugo-12, tidal flat: 7 (W).

Remarks. — This species, characterized by its distinctive pink claws in life, occurred together with *C. pestae* on this shallow sand flat. In general, the burrows of

these two species were found on a sandy strip between a *Zostera* bed and shore. At the edge of the *Zostera* bed these two species were taken together with *Upogebia pusilla*, but this latter species was the only one collected in the grass bed proper.

Although no copepod associates were found on this species in the Piran area, numerous copepods, apparently the same species associated with *C. pestae*, were found on *C. tyrrhena* subsequently collected at Rovinj (RBM Yugo-10).

*Gourettia minor* (Gourret 1887): - NA-PI-5A, 2.5 m.: 1 (P). — NA-PI-34, 7 m.: 1 (W). — NA-PI-98, 1 (P). — NA-PI-99, 1 (W).

Remarks. — This species has not been recorded previously from the Gulf of Piran. DE SAINT LAURENT & BOŽIĆ (1976) and, earlier, LUTZE (1937) (as *Callianassa denticulata*), recorded this species from two localities off southern Yugoslavia.

#### Family Upogebiidae.

*Upogebia pusilla* (Petagna 1792): - NA-PI-26, 19.5 m.: 5 (P, W). — Izliv Mirne (Mouth of Mirna river): 1 (P). — No data: 1 (P). — RBM Yugo-4, tidal flat: 10 + (W). — RBM Yugo-6, tidal flat: 10 (P, W). — RBM Yugo-8, marl bank, intertidal: 5 (W). — RBM Yugo-12, tidal flat: 4 (W).

*Upogebia tipica* (Nardo 1869): - B5 Q11, 10 m.: 1 (R). — NA-KO-6: 1 (P).

Remarks. — This species has not been recorded from the Piran area.

DE SAINT LAURENT (1971a) recently provided a key for the determination of Mediterranean species of *Upogebia*.

#### Family Diogenidae

*Clibanarius erythropus* (Latreille 1818): - Savudrijska obala: 2 (P).

*Diogenes pugilator* (Roux 1829): - NA-PI-26, 19.5 m.: 1 (P). — NA-ST-8B: 1 (P). — B3 Q6, 2 m.: 1 (R). — B3 Q9, 5 m.: 1 (R). — RBM Yugo-4, tidal flat: 7 (W). — RBM Yugo-5, tidal flat: 10 + (P, W). — RBM Yugo-12, tidal flat: 1 (W).

*Paguristes oculatus* (Fabricius 1775): - NA-PI-23, 13.5 m.: 1 (W). — NA-PI-25, 31 m.: 1 (W). — NA-PI-33, 4 m.: 1 (P). — NA-PI-54, 21.5 m.: 2 (P). — NA-PI-96: 1 (P). — NA-Piran: 1 (W).

#### Family Paguridae

*Anapagurus bicorniger* A. Milne Edwards & Bouvier 1892: - NA-PI-26, 19.5 m.: 1 (P).

*Cestopagurus timidus* (Roux 1830): - B1 Q7, 3 m.: 3 (R). — B2 Q7, 3 m.: 4 (R). — B2 Q8, 4 m.: 3 (R). — B4 Q9, 5 m.: 1 (R). — B5 Q8, 4 m.: 6 (R).

Remarks. — This species, which appears to be relatively common in sublittoral habitats, has not previously been recorded from the Piran Gulf. DE SAINT LAURENT (1968) assigned this species to *Cestopagurus*. It was placed in *Catapaguroides* by ZARIQUIEY ALVAREZ (1968).

*Pagurus anachoretus* Risso 1827: - NA-PI-23, 13.5 m.: 1 (W). — NA-PI-26, 19.5 m.: 1 (P). — B1 Q7, 3 m.: 1 (R). — B1 Q8, 4 m.: 4 m.: 3 (R). — B1 Q9, 5 m.: 5 (R). — B2 Q6, 2 m.: 1 (R). — B2 Q7, 3 m.: 2 (R). — B2 Q8, 4 m.: 2 (R). — B3 Q8, 4 m.: 2 (R). — B3 Q9, 4 m.: 1 (R). — B4 Q6, 2 m.: 1 (R). — B4 Q8, 4 m.: 1 (R). — B5 Q6, 2 m.: 3 (R). — B5 Q7, 3 m.: 3 (R). — B6 Q10, 7 m.: 1 (R).

*Pagurus cuanensis* Bell 1846: - NA-PI-1A, ca 22 m.: 1 (P). — NA-PI-26, 19.5 m.: 5 (W). — NA-Ronek: 1 (P). — B2 Q8, 5 m.: 1 (R). — B3 Q8, 4 m.: 1 (R). — B4 Q9b, 5 m.: 1 (R).

*Pagurus prideaux* Leach 1815: - NA-Piran: 6 (P,W).

#### Family Galatheididae

*Galathea bolivari* Zariquiey Alvarez 1950: - B2 Q6, 2 m.: 2 (R). — B2 Q7, 3 m.: 1 (R). — B4 Q9, 5 m.: 12 (R).

Remarks. — This species has not been recorded previously from the Piran area.

*Galathea cenarroi* Zariquiey Alvarez 1968: - B1 Q10, 7 m.: 1 (P).

Remarks. — This species has not been recorded previously from the Adriatic.

*Galathea intermedia* Lilljeborg 1851: - NA-PI-27, 17.5 m.: 1 (P). — NA-PI-43, 20 m.: 1 (P). — NA-PI-49, 12 m.: 1 (W). — NA-PI-54, 21.5 m.: 2 (P). — NA-PI-58, 13 m.: 1 (W). — B4 Q8, 5 m.: 4 (R).

*Galathea squamifera* Leach 1814: - B1 Q9, 7 m.: 1 (R). — Piran Gulf, 5-18 m.: 1 (R).

*Galathea strigosa* (Linnaeus 1767): - NA-Piran: 7 (P,W). — Piran Gulf, 5-18 m.: 5 (R). — No data: 1 (W).

#### Family Porcellanidae

*Pisidia bluteli* (Risso 1816): - B2 Q7, 3 m.: 1 (R). — B4 Q6, 2 m.: 1 (R). — B4 Q8, 5 m.: 2 (R). — B4 Q9, 5 m.: 2 (R). — B4 Q10, 7 m.: 11 (R). — B5 Q7, 3 m.: 2 (R). — B5 Q8, 4 m.: 3 (R). — B5 Q9, 5 m.: 1 (R). — B6 Q10, 7 m.: 3 (R). — B7 Q11, 10 m.: 2 (R). — RBM Yugo-1, rocky shore: 1 (W). — RBM Yugo-4, tidal flat: 9 (P,W).

Remarks. — This is the first record for this species from the Piran Gulf. HOLTHUIS (1961: 37) pointed out the differences between this species and the similar *P. longimana*. Some of our specimens appear to show intergradations between the two supposed species. HOLTHUIS also recorded material from the Adriatic Sea, near Split, Yugoslavia.

*Pisidia longimana* (Risso 1816): - NA-PI-25-27, 17.5-31 m.: 13 (P,W). — NA-PI-29, 17 m.: 20+ (P). — NA-PI-43, 20 m.: 9 (P). — NA-PI-49, 12 m.: 2 (P). — NA-PI-53, 20.5 m.: 2 (P). — Savudrijska obala: 7 (W). — B1 Q10, 7 m.: 1 (R). — B2 Q7, 3 m.: 2 (R). — B2 Q8, 4 m.: 2 (R). — B3 Q8: 1 (R). — Piran Gulf, 5-18 m.: 1 (R). — RBM Yugo-2, tidepools: 7 (W). — NA-KO-1: 3 (P).

Remarks. — This is the first record for this common, widespread species from the Piran Gulf. Earlier authors may have confused this as well as the preceding species with the deeper water *Pisidia longicornis* (Linnaeus 1767).

*Porcellana platycheles* (Pennant, 1777): - Savudrijska obala: 3 (P,W). — RBM Yugo-1, rocky shore: 34 (W). — RBM Yugo-4, tidal flat: 1 (W).

#### Family Dromiidae

*Dromia personata* (Linnaeus 1758): - NA-PI-26, 19.5 m.: 1 (W). — NA-Piran: 1 (P). — Savudrijska obala: 2 (W). — Piran Gulf, 5-18 m.: 3 (R). — No data: 2 (W).

#### Family Dorippidae

*Ethusa mascarone* (Herbst 1785): - NA-PI-2A, ca. 22 m.: 2 (W). — NA-PI-26, 19.5 m.: 3 (P). — Piran Gulf, 5-18 m.: 1 (R).

## Family Leucosiidae

*Ebalia edwardsi* Costa 1838: - St. 7, 10 m. 12.III.73: 1 (P).

Remarks. — This is the first record for this species from the Piran Gulf.

*Ilia nucleus* (Linnaeus 1758): - Piran Gulf, 5-18 m.: 6 (R). — Piran: 2 (P,W).

## Family Pirimelidae

*Sirpus zariquieyi* Gordon 1953: - B4 Q6, 2 m.: 1 (P).

Remarks. — This species, which appears to be relatively widely distributed in the Mediterranean, has not been recorded previously from the Piran Gulf. It recently was recorded from Rovinj by ŠTEVČIĆ (1971).

## Family Portunidae

*Carcinus aestuarii* Nardo 1847: - B3 Q9, 5 m.: 1 (R). — RBM Yugo-4 tidal flat: 10 (P,W). — RBM Yugo-6, tidal flat: 1 (W). — RBM Yugo-8, marl bank, intertidal: 2 (W). — RBM Yugo-12, tidal flat: 5 (W). — No data: 1 (P).

Remarks. — MANNING & HOLTHUIS (1981: 74) pointed out that this was the oldest available name for the species previously known as *C. mediterraneus* Czerniavsky 1884.

*Liocarcinus arcuatus* Leach 1814: - NA-PI-23, 13.5 m.: 3 (P,W). — B3 Q4, 0.5 m.: 1 (R).

*Liocarcinus depurator* (Linnaeus 1758): - NA-PI-34, 7 m.: 1 (W). — NA-Umag: 1 (P).

*Liocarcinus maculatus* (Leach 1816): - NA-PI-26, 19.5 m.: 1 (P).

## Family Xanthidae

*Eriphia verrucosa* (Forsk. 1775): - Piran Gulf, 5-18 m.: 4 (R). — NA-Piran: 1 (P).

*Pilumnus aestuarii* Nardo 1869: - B5 Q9, 4 m.: 1 (P).

Remarks. — Although originally described from Venice, this species, either relatively rare or very difficult to recognize, has been recorded only rarely in the literature. It has not been recorded previously from the Piran area.

*Pilumnus spinifer* H. Milne Edwards 1834: - NA-PI-23, 13.5 m.: 2 (P). — NA-PI-25-27, 17.5-31 m.: 13 (P,W). — NA-PI-29, 17 m.: 1 (P). — Savudrijska obala: 1 (W). — B1 Q9, 5 m.: 1 (R). — B4 Q9, 5 m.: 1 (R). — Piran Gulf, 5-18 m.: 9 (R).

Remarks. — Apparently this common species has not been recorded previously from the Piran Gulf. Material of *P. spinifer* may have been confused with *P. hirtellus* by earlier workers.

*Xantho poressa* (Olivi 1792): - Savudrijska obala: 1 (P). — Piran Gulf, 5-18 m.: 4 (R). — RBM Yugo-1, rocky shore: 13 (P,W). — RBM Yugo-4, tidal flat: 1 (W).

## Family Pinnotheridae

*Pinnotheres pinnotheres* (Linnaeus 1758): - NA-PI-25, 31 m.: 1 (P). — NA-PI-26, 19.5 m.: 1 (W).

*Pinnotheres pisum* (Linnaeus 1767): - NA-PI-2A: 3 (P,W).

## Family Goneplacidae

*Goneplax rhomboides* (Linnaeus 1758): - Piran Gulf, 5-18 m.: 1 (R). — Off Piran: 2 (P,W).

## Family Grapsidae

*Brachynotus sexdentatus* (Risso 1827): - RBM Yugo-4, tidal flat: 5 (W).

Remarks. — Apparently this common intertidal species has not been recorded previously from the Piran area. As pointed out by ŠTEVČIĆ (1971), this species occurs in the Limski Canal, north of Rovinj, where collections made during 1973 (RBM-Yugo-11) indicate that it is extremely common.

*Pachygrapsus marmoratus* (Fabricius 1787): - RBM Yugo-8, marl bank, intertidal: 1 (W).

## Family Parthenopidae

*Parthenope angulifrons* (Latreille 1829): - NA-Piran: 2 (P,W). — Savudrijska obala: 1 (W).

## Family Majidae

*Acanthonyx lunulatus* (Risso 1816): - B2 Q5, 1m.: 1 (R).

*Achaeus cranchii* Leach 1817: - B1 Q1, 1 + m.: 1 (R). — B4 Q9b, 5 m.: 1 (R).

*Eurynome aspera* (Pennant 1777): - NA-PI-1A, ca. 22 m.: 10 (P,W). — NA-PI-25, 31 m.: 1 (P). — NA-PI-96: 1 (W). — No data: 1 (W).

*Inachus communissimus* Rizza 1839: - About 1 mi NW of Piran: 1 (W). — NA-Ronek: 1 (P).

Remarks. — This species, only recently differentiated from *Inachus dorsettensis* (Pennant 1777) by FOREST (1965), has not been recorded previously from as far north in the Adriatic as the Gulf of Piran. Material of this species probably has been confused with *I. dorsettensis* by investigators prior to 1965.

*Inachus thoracicus* (Roux 1830): - NA-PI-1A, ca. 22 m.: 1 (P). — NA-Umag: 1 (W).

*Inachus dorsettensis* (Pennant 1777): - NA-PI-3A, 6 m.: 3 (P,W).

*Macropodia linaresi* Forest & Zariquiey Alvarez 1964: - NA-PI-2A, ca. 22 m.: 1 (P).

Remarks. — This species has not been recorded previously from the Gulf of Piran. Only recently it was recorded from the Rovinj area by ŠTEVČIĆ (1971).

*Macropodia longirostris* (Fabricius 1775): - NA-PI-Fra Giacomo: 1 (P). — B3 Q9, 5 m.: 1 (R). — B4 Q2, 0 m.: 3 (R).

*Macropodia rostrata* (Linnaeus 1761): - NA-PI-1A, ca. 22 m.: 1 (P). — NA-PI-2A, ca. 22 m.: 2 (W). — Off Piran: 5 (W). — About 1 mi. NW of Piran: 9 (W). — Piran Gulf, 5-18 m.: 3 (R). — B1 Q9, 5 m.: 1 (R). — RBM Yugo-6, tidal flat: 1 (W).

*Maja crispata* Risso 1827: - Piran Gulf, 5-18 m.: 10 (R). — Off Piran: 2 (P,W).

*Maja squinado* (Herbst 1788): - NA-Piran: 1 (P). — NA-PI-PO: 1 (W).

*Pisa corallina* (Risso 1816): - NA-Piran: 1 (P).

*Pisa mucosa* (Linnaeus 1758): - B2 Q6, 3 m.: 1 (P).

Remarks. — This species has not been recorded previously from the Piran area.

*Pisa nodipes* (Leach 1815): - NA-PI-2A, ca. 22 m.: 1 (P). — Savudrijska obala: 1 (W). — B2 Q6, 3 m.: 1 (R). — Piran Gulf, 5-18 m.: 2 (R). — No data: 1 (W).

*Pisa tetraodon* (Pennant 1777): - B5 Q7, 3 m.: 1 (R).

## Checklist of the Decapod Crustacea of the Piran Area. Data for Rovinj from ŠTEVČIĆ (1971, 1976)

SPECIES	Record		
	Old	Present	Rovinj
<i>Sicyonia carinata</i> (Brünnich 1768)	+	+	+
<i>Hippolyte holthuisi</i> Zariquiey Alvarez 1953	+	+	+
<i>Hippolyte inermis</i> Leach 1815	+	+	+
<i>Hippolyte leptocerus</i> (Heller 1863)	—	+	—
<i>Hippolyte longirostris</i> (Czerniavsky 1868)	+	+	+
<i>Lysmata seticaudata</i> (Risso 1816)	+	—	+
<i>Thoralus cranchii</i> (Leach 1817)	+	+	+
<i>Alpheus dentipes</i> Guérin 1832	+	+	+
<i>Alpheus glaber</i> (Olivi 1792)	+	+	+
<i>Alpheus macrocheles</i> (Hailstone 1835)	+	+	+
<i>Athanas nitescens</i> (Leach 1814)	+	+	+
<i>Synalpheus gambarelloides</i> (Nardo 1847)	+	+	+
<i>Processa canaliculata</i> Leach 1815	?	—	+
<i>Processa edulis edulis</i> (Risso 1816)	+	+	—
<i>Processa modica carolii</i> Williamson & Rochanaburanon 1979	—	+	+
<i>Palaemon adpersus</i> Rathke 1837	+	+	—
<i>Palaemon elegans</i> Rathke 1837	+	+	+
<i>Palaemon serratus</i> (Pennant 1777)	+	—	+
<i>Palaemon xiphias</i> Risso 1816	+	+	+
<i>Periclimenes scriptus</i> (Risso 1822)	+	—	+
<i>Pontonia flavomaculata</i> Heller 1864	+	—	—
<i>Typton spongicola</i> Costa 1844	+	—	+
<i>Crangon crangon</i> (Linnaeus 1758)	+	+	+
<i>Pontocaris cataphracta</i> (Olivi 1792)	+	—	+
<i>Pontophilus fasciatus</i> (Risso 1816)	+	+	+
<i>Pontophilus monacanthus</i> Holthuis 1961	—	+	—
<i>Homarus gammarus</i> (Linnaeus 1758)	+	—	+
<i>Nephrops norvegicus</i> (Linnaeus 1758)	+	—	—
<i>Palinurus elephas</i> (Fabricius 1787)	+	—	—
<i>Scyllarus arctus</i> (Linnaeus 1758)	+	—	+
<i>Jaxea nocturna</i> Nardo 1847	+	+	+
<i>Callinassa pestae</i> De Man 1928	+	+	+
<i>Callinassa tyrrhena</i> (Petagna 1792)	+	+	+
<i>Gourretia minor</i> (Gourret 1887)	—	+	—
<i>Upogebia pusilla</i> (Petagna 1792)	+	+	+
<i>Upogebia tipica</i> (Nardo 1869)	—	+	—
<i>Clibanarius erythropus</i> (Latreille, 1818)	+	+	+
<i>Dardanus arrosor</i> (Herbst 1796)	+	—	—
<i>Dardanus calidus</i> (Risso 1827)	+	—	—
<i>Diogenes pugilator</i> (Roux 1829)	+	+	+
<i>Paguristes oculatus</i> (Fabricius 1775)	+	+	+
<i>Anapagurus bicorniger</i> A. Milne Edwards & Bouvier 1892	+	+	—
<i>Anapagurus laevis</i> (Bell 1846)	—	—	+
<i>Cestopagurus timidus</i> (Roux 1830)	—	+	+
<i>Pagurus alatus</i> Fabricius 1775	+	—	+
<i>Pagurus anachoretus</i> Risso 1827	+	+	+
<i>Pagurus cuanensis</i> Bell 1846	+	+	+
<i>Pagurus prideaux</i> Leach 1815	+	+	+
<i>Galathea bolivari</i> Zariquiey Alvarez 1950	—	+	—
<i>Galathea cearroi</i> Zariquiey Alvarez 1968	—	+	—



SPECIES	Record		
	Old	Present	Rovinj
<i>Galathea intermedia</i> Lilljeborg 1851	+	+	+
<i>Galathea nexa</i> Embleton 1834	+	—	+
<i>Galathea squamifera</i> Leach 1814	+	+	+
<i>Galathea strigosa</i> (Linnaeus 1767)	+	+	+
<i>Munida rugosa</i> (Fabricius 1775)	+	—	—
<i>Pisidia bluteli</i> (Risso 1816)	—	+	—
<i>Pisidia longicornis</i> (Linnaeus, 1767)	+	—	—
<i>Pisidia longimana</i> (Risso 1816)	·?	+	+
<i>Porcellana platycheles</i> (Pennant 1777)	+	+	+
<i>Dromia personata</i> (Linnaeus 1758)	+	+	+
<i>Homola barbata</i> (Fabricius 1793)	+	—	—
<i>Medorippe lanata</i> (Linnaeus 1767)	+	—	+
<i>Ethusa mascarone</i> (Herbst 1785)	+	+	+
<i>Ebalia cranchii</i> Leach 1817	+	—	+
? <i>Ebalia costae</i> ? = <i>edwardsi</i>	+	—	—
<i>Ebalia edwardsi</i> Costa 1838	—	+	+
<i>Ebalia granulosa</i> H. Milne Edwards 1837	+	—	+
<i>Ilia nucleus</i> (Linnaeus 1758)	+	+	+
<i>Atelecyclus rotundatus</i> (Olivi 1792)	+	—	+
<i>Cancer pagurus</i> Linnaeus 1758	+	—	—
<i>Pirimela denticulata</i> (Montagu 1808)	+	—	+
<i>Corystes cassivelaunus</i> (Pennant 1777)	+	—	—
<i>Sirpus zariquieyi</i> Gordon 1953	—	+	+
<i>Carcinus aestuarii</i> Nardo 1847	+	+	+
<i>Liocarcinus arcuatus</i> (Leach 1814)	+	+	+
<i>Liocarcinus corrugatus</i> (Pennant 1777)	+	—	+
<i>Liocarcinus depurator</i> (Linnaeus 1758)	+	+	+
<i>Liocarcinus maculatus</i> (Leach 1816)	+	+	+
<i>Portumnus latipes</i> (Pennant 1777)	+	—	+
<i>Eriphia verrucosa</i> (Forskål 1775)	+	+	+
<i>Monodaeus couchi</i> (Couch 1851)	+	—	—
<i>Pilumnus aestuarii</i> Nardo 1869	—	+	—
<i>Pilumnus hirtellus</i> (Linnaeus 1761)	+	—	+
<i>Pilumnus spinifer</i> H. Milne Edwards 1834	—	+	+
<i>Pilumnus villosissimus</i> (Rafinesque 1814)	+	—	—
<i>Xantho granulicarpus</i> Forest 1953	+	—	+
<i>Xantho poressa</i> (Olivi 1792)	+	+	+
<i>Pinnotheres pinnotheres</i> (Linnaeus 1758)	+	+	+
<i>Pinnotheres pisum</i> (Linnaeus 1767)	+	+	+
<i>Goneplax rhomboides</i> (Linnaeus 1758)	+	+	+
<i>Brachynotus sexdentatus</i> (Risso 1827)	—	+	+
<i>Pachygrapsus marmoratus</i> (Fabricius 1787)	+	+	+
<i>Parthenope angulifrons</i> Latreille 1825	+	+	+
<i>Parthenope massena</i> (Roux 1830)	+	—	+
<i>Acanthonyx lunulatus</i> (Risso 1816)	+	+	+
<i>Achaeus cranchii</i> (Leach 1817)	+	+	+
<i>Eurynome aspera</i> (Pennant 1777)	+	+	+
<i>Inachus communissimus</i> Rizza 1839	—	+	+
<i>Inachus dorsettensis</i> (Pennant 1777)	+	+	+
<i>Inachus thoracicus</i> (Roux 1830)	+	+	+
<i>Lissa chiragra</i> (Fabricius 1775)	+	—	+
<i>Macropodia linaresi</i> Forest and Zariquiey Alvarez 1964	—	+	+
<i>Macropodia longirostris</i> (Fabricius 1775)	+	+	+

SPECIES	Record		
	Old	Present	Rovinj
<i>Macropodia rostrata</i> (Linnaeus 1761)	+	+	+
<i>Maja squinado</i> (Herbst 1788)	+	+	+
<i>Maja crispata</i> Risso 1827	+	+	+
<i>Pisa armata</i> (Latreille 1803)	+	—	+
<i>Pisa corallina</i> (Risso 1816)	+	+	+
<i>Pisa muscosa</i> (Linnaeus 1758)	—	+	—
<i>Pisa nodipes</i> (Leach 1815)	+	+	+
<i>Pisa tetraodon</i> (Pennant 1777)	+	+	+

## DISCUSSION

As indicated by the checklist given above, more than 90 species of Decapoda are known from the region around the Piran Gulf. However, some of the older records have to be accepted with reservations. Thus *Dardanus arrosor* and *Munida rugosa*, reported from the area in older works, have not been taken in the northern part of the Adriatic Sea; the first of these occurs in the southern part of the sea, near Dubrovnik, and the other, like *Homola barbata*, is known to occur in deeper habitats than available in the Piran Gulf. A similar situation exists with records of *Monodaeus couchii*. Materials of all of these species recorded from the area should be re-examined.

We believe that it would be very important to revise the collection of TITIUS; much important material documenting the occurrence of various species in the area might be found in his unreported collections. Thus J. FOREST found material of *Inachus communissimus* collected by TITIUS in the collection of the Zoologisches Staatsammlung in Munich; that material provided the first record of the species from the Adriatic.

A comparison of new and old records reveals that 17 species are new records for the area. However, apart from the problematical identifications mentioned above, some 30 species recorded from the area in the past have not been taken during this survey. Inasmuch as most of these species are present in the northern Adriatic Sea, they can be expected to be found in suitable habitats in the Piran Gulf.

Finally, we point out that the decapod fauna of this relatively small area, with its shallow water habitats, influx of freshwater, and relatively high amount of pollution, is fairly rich. Continuing investigations on the fauna should yield additional species of decapods.

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