

# *Dikerogammarus villosus*



Taxon	Family / Order / Class / Phylum
<i>Dikerogammarus villosus</i> (Sowinsky, 1894)	Gammaridae / Amphipoda / Crustacea / Arthropoda

## COMMON NAMES (English only)

Killer shrimp

## SYNONYMS

## SHORT DESCRIPTION

The killer shrimp is an omnivorous predator. It can feed on a variety of macroinvertebrates, including other gammarid species, and exhibits an important biotic potential and ecological plasticity.

## BIOLOGY/ECOLOGY

### Dispersal mechanisms

Unknown, probably through shipping activity

### Reproduction

The females are sexually mature at 6 mm in length, when they reach 4 to 8 weeks old. They can reproduce when water temperature is above 13°C, with a mean fecundity of 27.3 eggs per female. Hatching length is about 1.8 mm.

### Known predators/herbivores

Several fish species feed on this shrimp, but no invertebrate species is known to predate it.

### Resistant stages (seeds, spores etc.)

None.

## HABITAT

### Native (EUNIS codes)

A1: Littoral rock and other hard substrata, A2: Littoral sediments, A3: Sublittoral rock and other hard substrata, A4: Sublittoral sediments, B1: Coastal dune and sand habitats, B3: Rock cliffs, ledges and shores, including the supralittoral, C1: Surface standing waters, C2: Surface running waters, C3: Littoral zone of inland surface waterbodies. Hard substratum, macrophytes.

### Habitat occupied in invaded range (EUNIS codes)

A1: Littoral rock and other hard substrata, A2: Littoral sediments, A3: Sublittoral rock and other hard substrata, A4: Sublittoral sediments, B1: Coastal dune and sand habitats, B3: Rock cliffs, ledges and shores, including the supralittoral, C1: Surface standing waters, C2: Surface running waters, C3: Littoral zone of inland surface waterbodies. Hard substratum, macrophytes.

### Habitat requirements

The species exhibits a wide range of environmental tolerance. It can live in a broad spectrum of temperatures (0 to 30 °C) and salinity (up to 12‰), and can occupy every substratum except sand. The species is only present in areas with low current velocity.

## DISTRIBUTION

### Native Range

Ponto-caspian basin

### Known Introduced Range

Almost all Western Europe large rivers (Rhône, Loire, Seine, Moselle, Meuse, Rhine, Main, Danube) and Baltic Sea basin






## Trend

Spreading.

## MAP (European distribution)



### Legend

	Known in country		Known in CGRS square		Known in sea
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## INTRODUCTION PATHWAY

The most likely introduction vector is shipping (ballast water and hull fouling of vessels). The colonisation of western European hydrosystems probably occurred through the southern corridor, via the Danube and Rhine Rivers

## IMPACT

### Ecosystem Impact

It locally eliminates other gammarid species through competition and predation. There have been some observations of the species eating fish eggs or attacking small fishes.

### Health and Social Impact

Unknown.

### Economic Impact

Unknown.

## MANAGEMENT

### Prevention

Ballast water treatment for transcontinental dispersion. No effective solution has been proposed for intracontinental dispersion.

### Mechanical

Unknown.

### Chemical

Unknown.

### Biological

Unknown. Biotic control (by parasites and/or predator species) remain poorly documented.

## REFERENCES

Barnard JL, Barnard CM (1983) Freshwater Amphipoda of the world I. Evolutionary patterns. II. Handbook and bibliography. - Hayfield Associates (eds) p 717

- Bollache L, Devin S, Wattier R, Chovet M, Beisel JN, Moreteau JC, Rigaud T (2004) Rapid range extension of the Ponto-Caspian amphipod *Dikerogammarus villosus* in France: potential consequences. - *Archiv für Hydrobiologie* 160:57-66
- Bij de Vaate A, Jazdzewski K, Ketelaars HAM, Gollasch S, Van der Velde G (2002) Geographical patterns in range extension of Ponto-Caspian macroinvertebrates species in Europe. - *Canadian Journal of Fisheries and Aquatic Sciences* 59:1159-1174

#### OTHER REFERENCES

- Bij de Vaate A, Klink AG (1995) *Dikerogammarus villosus* SOWINSKY (Crustacea: Gammaridae) a new immigrant in the Dutch part of the Lower Rhine. - *Lauterbornia* 20:51-54
- Brujns MCM, Kelleher B, Van der Velde G, Bij de Vaate A (2001) Oxygen consumption, temperature and salinity tolerance of the invasive amphipod *Dikerogammarus villosus*: indicators of further dispersal via ballast water transport. - *Archiv für Hydrobiologie* 152:633-646
- Cărbăușu S., Dobreanu E, Manolache C (1955) Amphipoda. - *Fauna Republicii Populare Romîne*. - Vol. 4
- Ciolpan O (1987) Zur Fortpflanzung von *Dikerogammarus villosus* (Sow.) Mart. (Crustacea-Amphipoda) im Eisernes Tor - Stausee (Bahna-Golf, 1983-1984). - *Revue Roumaine de Biologie* 32:71-74
- Devin S, Beisel JN, Bachmann V, Moreteau JC, (2001) *Dikerogammarus villosus* (Amphipoda: Gammaridae): Another invasive species newly established in the Moselle River and French hydrosystems. - *Annales de Limnologie-International Journal of Limnology* 37:21-27
- Devin S, Bollache L, Beisel JN, Moreteau JC, Perrot-Minot MJ (2004) Pigmentation polymorphism in the invasive amphipod species *Dikerogammarus villosus*: some insights into its maintenance. *Journal of Zoology* 264(4):391-397
- Devin S, Piscart C, Beisel JN, Moreteau JC, (2003) Ecological traits of the amphipod invader *Dikerogammarus villosus* on a mesohabitat scale. - *Archiv für Hydrobiologie* 158:43-56
- Dick JTA, Platvoet D (2000) Invading predatory crustacean *Dikerogammarus villosus* eliminates both native and exotic species. - *Proceedings of the Royal Society of London - Series B: Biological Sciences* 267:977-983
- Dick JTA, Platvoet D, Kelly DW (2002) Predatory impact of the freshwater invader, *Dikerogammarus villosus* (Crustacea: Amphipoda). - *Canadian Journal of Fisheries and Aquatic Sciences* 59:1078-1084
- Gledhill T, Sutcliffe DW, Williams WD (1993) *British freshwater Crustacea Malacostraca: a key with ecological notes*, p 173
- Jazdzewski K (1980) Range extension of some gammaridean species in european inland waters caused by human activity. - *Crustaceana Suppl.* 6:84-107
- Jazdzewski K, Konopacka A (1988) Notes on the gammaridean amphipoda of the Dniester river basin and eastern Carpathians. - *Crustaceana Suppl.* 13:72-89
- Kelleher B, Bergers PJM, Van den Brink FWB, Ggiller FWB, Van der Velde G, Bij de Vaate A (1998) Effects of exotic amphipod invasions on fish diet in the Lower Rhine. - *Archiv für Hydrobiologie* 143: 363-382
- Kelleher B, Van der Velde G, Giller PS, Bij de Vaate A (2000) Dominant role of exotic invertebrates, mainly Crustacea, in diets of fish in the lower Rhine River. - *Crustacean Issues* 12:35-46
- Kley A, Maier G (2003) Life history characteristics of the invasive freshwater gammarids *Dikerogammarus villosus* and *Echinogammarus ischnus* in the river Main and the Main-Donau canal. - *Archiv für Hydrobiologie* 156:457-469
- Müller J, Schramm S, Seitz A (2002) Genetic and morphological differentiation of *Dikerogammarus* invaders and their invasion history in Central Europe. - *Freshwater Biology* 47:2039-2048
- Muskó IB (1992) Amphipoda species found in Lake Balaton since 1987. - *Miscellanea Zoologica Hungarica* 7:59-64
- Muskó IB (1993) The life history of *Dikerogammarus haemobaphes* (EICHW.) (Crustacea: Amphipoda) living on macrophytes in Lake Balaton (Hungary). - *Archiv für Hydrobiologie* 127:227-238
- Sporka F (1999) First record of *Dikerogammarus villosus* (Amphipoda, Gammaridae) and *Jaera istri* (Isopoda, Asselota) from the Slovak-Hungarian part of the Danube River. - *Biologia* 54:538

Author: Simon Devin and Jean-Nicolas Beisel

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