



MarLIN

Marine Information Network

Information on the species and habitats around the coasts and sea of the British Isles

Gravel sea cucumber (*Neopentadactyla mixta*)

MarLIN – Marine Life Information Network
Biology and Sensitivity Key Information Review

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A report from:

The Marine Life Information Network, Marine Biological Association of the United Kingdom.

Please note. This MarESA report is a dated version of the online review. Please refer to the website for the most up-to-date version [<https://www.marlin.ac.uk/species/detail/1317>]. All terms and the MarESA methodology are outlined on the website (<https://www.marlin.ac.uk>)

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Feeding tentacles of *Neopentadactyla mixta* protruding from gravel.

Photographer: Sue Scott

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See online review for
distribution map

Distribution data supplied by the Ocean Biogeographic Information System (OBIS). To interrogate UK data visit the NBN Atlas.

Researched by	Angus Jackson	Refereed by	Dr Andrew C. Campbell
Authority	(Östergren, 1898) Deichmann, 1944		
Other common names	-	Synonyms	<i>Pseudocucumis mixta</i> (Östergren, 1898) Deichmann, 1944

Summary

🔍 Description

Neopentadactyla mixta is a cylindrical sea cucumber up to about 20 cm long and creamy yellow in colour. The body tapers towards either end and there are a bunch of profusely branching tentacles around the mouth. The tentacles are usually light grey but may be darker, appearing almost transparent when fully extended. The gravel sea cucumber lives within the substratum so the only parts visible are the tentacles, when extended.

📍 Recorded distribution in Britain and Ireland

All up the west coast of Scotland to Orkney and Shetland. A few isolated records from the east coast. Also from SW England, SW and NW Wales. In Ireland, particularly Kilkieran Bay, round the north and north-east, also the SE and SW corners.

📍 Global distribution

South, west and north coasts of the British Isles, the Faeroe Islands, the west coast of Norway (Molde) and the Atlantic coasts of France.

 **Habitat**

The gravel sea cucumber lives within coarse, typically mobile shell sand, gravel or maerl where water flow is quite strong.

 **Depth range**

15-70

 **Identifying features**

- Found in coarse gravel or maerl with only the buccal tentacles showing above the surface.
- There are 20 tentacles, 10 large, 5 intermediate and 5 small.
- The tentacles are thicker at the base than the tip and branch in a highly arborescent fashion.
- There are numerous calcareous deposits in the skin.

 **Additional information**

Various descriptions of the tentacles have been made regarding the layout and size of the rings. One of the most recent states that there are twenty in total arranged pentaradially around the mouth. There are ten large outer tentacles arranged as five pairs, then within these, five single intermediate tentacles and then the inside ring is of five small tentacles. Tube feet are usually confined to the radii and may be crowded in the middle of the body.

 **Listed by** **Further information sources**

Search on:

   **NBN WoRMS**

Biology review

☰ Taxonomy

Phylum	Echinodermata	Starfish, brittlestars, sea urchins & sea cucumbers
Class	Holothuroidea	Sea cucumbers
Order	Dendrochirotida	
Family	Phyllophoridae	
Genus	Neopentadactyla	
Authority	(Östergren, 1898) Deichmann, 1944	
Recent Synonyms	Pseudocucumis mixta (Östergren, 1898) Deichmann, 1944	

🌿 Biology

Typical abundance	High density
Male size range	Up to 25cm
Male size at maturity	
Female size range	Medium-large(21-50cm)
Female size at maturity	
Growth form	Cylindrical
Growth rate	No information found
Body flexibility	
Mobility	Burrower
Characteristic feeding method	Passive suspension feeder
Diet/food source	Omnivore
Typically feeds on	Seston
Sociability	Solitary
Environmental position	Infaunal
Dependency	No text entered.
Supports	Host <i>Melanella alba</i> .
Is the species harmful?	Data deficient

🏛️ Biology information

- In suitable habitat, densities have been recorded as high as 400 per square metre. In 1973, the population in Kilkieran Bay appeared to be increasing.
- Most sea cucumbers are gonochoristic although some species are hermaphrodite.
- The values for length apply to body length excluding the tentacular crown. When extended, the tentacular crown can be up to a quarter of the body length and have a spread of 140 square cm. The gravel sea cucumber is an infaunal burrower and is only visible when the tentacles are projected above the surface. The body is generally held in a u-shape within the sediment with the tentacles held in the water column and the terminal anus just at the surface.
- Food particles are trapped using special adhesive areas at the tips of the tentacles. To ingest food, a tentacle is inserted into the mouth, the buccal membrane constricts and the

tentacle withdrawn, scraping off any adherent food particles.

- *Melanella alba*, a eulimid gastropod is a temporary ectoparasite on *Neopentadactyla mixta*, piercing the skin and feeding on the internal organs.

Habitat preferences

Physiographic preferences	Open coast, Strait / sound, Sea loch / Sea lough, Ria / Voe
Biological zone preferences	Lower infralittoral, Upper circalittoral
Substratum / habitat preferences	Gravel / shingle, Maerl
Tidal strength preferences	Moderately Strong 1 to 3 knots (0.5-1.5 m/sec.), Weak < 1 knot (<0.5 m/sec.)
Wave exposure preferences	Exposed, Moderately exposed, Sheltered, Very sheltered
Salinity preferences	Full (30-40 psu)
Depth range	15-70
Other preferences	No text entered
Migration Pattern	Diel, Seasonal (feeding)

Habitat Information

Although not necessarily representative of all populations, *Neopentadactyla mixta* exhibits regular daily and seasonal movements within the substratum. In the Kilkieran Bay population, individuals withdraw further into the sediment between 1 or 4 hours after sunrise and remain in the substratum for 1 or 2 hours, re-emerging over a period of up to four hours. In September/October the entire population withdraws into the substratum and re-emerges in March/April. They remain buried in aerobic conditions at depths of up to 60 cm with tentacles retracted and not feeding. Considerable loss of condition occurs during this time. Direct absorption of dissolved organic matter may be important for nutrition. This state of torpor is not complete, respiration and activity is greatly reduced but some movement within the substratum still occurs. Depth of burial is maintained despite surface changes in gravel with water movement.

Life history

Adult characteristics

Reproductive type	No information
Reproductive frequency	No information
Fecundity (number of eggs)	No information
Generation time	Insufficient information
Age at maturity	No information found.
Season	Insufficient information
Life span	Insufficient information

Larval characteristics

Larval/propagule type	-
Larval/juvenile development	No information

Duration of larval stage	No information
Larval dispersal potential	No information
Larval settlement period	Insufficient information

Life history information

No information has been found in relation to longevity or reproduction. Breeding is presumed to occur between April and September when the population is at the substratum surface. Most holothurians are gonochoristic and are broadcast spawners (although some species brood their larvae). The larvae of some species show planktotrophy, others lecithotrophy, some direct development, others indirect.

Sensitivity review

This MarLIN sensitivity assessment has been superseded by the MarESA approach to sensitivity assessment. MarLIN assessments used an approach that has now been modified to reflect the most recent conservation imperatives and terminology and are due to be updated by 2016/17.

A Physical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Substratum Loss	High		High	Low
<i>Neopentadactyla mixta</i> lives within gravel or maerl substrata. Loss of this substrata would result in the loss of the population.				
Smothering	Low		Moderate	Moderate
Although not a fast mover, <i>Neopentadactyla mixta</i> is a quite large active burrower. Smothering by five cm of sediment should not cause too many problems and the sea cucumber will probably be able to burrow back up to the surface. Individuals of this species spend much of the winter buried up to 60 cm deep in aerobic sediment. During this winter period, a torpid stage is entered with respiration and activity greatly reduced. Given sufficient aeration, this species can tolerate long periods without feeding. This may indicate that even if the surface cannot be regained immediately then the species could tolerate a period of smothering. There will be an energetic cost and feeding will be curtailed. Smothering for a month will be less problematic if it occurs during the period when the sea cucumbers are buried within the substratum.				
Increase in suspended sediment	High		High	Low
A slight increase in siltation may benefit this species through greater availability of food particles. Larger increases in siltation will cause feeding to stop, the tentacles to be retracted and withdrawal into the substratum. Although the species can tolerate long periods (up to 8 months) without feeding within the substratum, considerable loss of condition occurs during this time. Prevention of feeding for a whole year through increased siltation will probably cause death.				
Decrease in suspended sediment				
Desiccation	High		High	Low
The species only occurs subtidally (below 15 m). The tube feet and tentacles provide surfaces through which water could easily be lost. Exposure to desiccating influences for an hour will probably cause death.				
Increase in emergence regime	High		High	Low
The species only occurs subtidally (below 15 m) and is not subject to emergence. Emergence for an hour will probably cause death.				
Decrease in emergence regime				
Increase in water flow rate	High		High	Moderate
The gravel sea cucumber is a passive suspension feeder and requires a reasonable flow of water to provide sufficient food particles. The tentacular crown is held up in the water column				

in order to feed. Strong water flow causes the tentacles to be displaced and bent. This can only be tolerated up to a point and beyond that sea cucumber retracts its tentacles and withdraws into substratum. This would prevent feeding. Although the species can tolerate long periods (up to 8 months) without feeding within the substratum, considerable loss of condition occurs during this time. Prevention of feeding for a whole year will probably cause death.

Decrease in water flow rate

Increase in temperature **Intermediate** **High** **Low**

The British Isles falls in the middle of the geographic range of this species. Small chronic changes in temperature will probably have little effect. Short acute changes in temperature may cause death. Temperature changes will have less effect when the population is buried within the substratum and respiration and metabolism are greatly reduced.

Decrease in temperature

Increase in turbidity **Tolerant** **Not sensitive** **Low**

The species has no requirement for photosynthesis and probably only has very limited facility for visual perception. Changes in turbidity will probably have no effect.

Decrease in turbidity

Increase in wave exposure **High** **High** **Moderate**

The gravel sea cucumber is a passive suspension feeder and requires a reasonable water movement to provide sufficient food particles. The tentacular crown is held up in the water column in order to feed. Strong wave action causes the tentacles to be displaced and bent. This can only be tolerated up to a point and beyond that sea cucumber retracts its tentacles and withdraws into substratum. This would prevent feeding. Although the species can tolerate long periods (up to 8 months) without feeding within the substratum, considerable loss of condition occurs during this time. Prevention of feeding for a whole year will probably cause death. One large storm on the west coast of Ireland was noted to cause *Neopentadactyla mixta* to withdraw into the sediment and remain there for ten days (Smith and Keegan, 1984).

Decrease in wave exposure

Noise **Low** **Moderate** **Moderate**

Slight vibrations within the immediate substratum will provoke total withdrawal. This will prevent feeding. If the vibration is continuous, habituation may occur. If the noise occurs during the period of torpor then the species will be tolerant.

Visual Presence **Tolerant** **Not relevant** **Not sensitive** **High**

The species probably only has very limited facility for visual perception.

Abrasion & physical disturbance **Intermediate** **High** **Low**

The gravel sea cucumber is highly flexible and has a tough skin but the tentacles are more likely to be damaged by abrasion. *Neopentadactyla mixta* lives infaunally and hence may avoid physical disturbance caused by a passing dredge, particularly when deeply buried in a state of torpor. Echinoderms are well known for their regenerative abilities. However, no information regarding recruitment or recovery was found.

Displacement **Tolerant** **Not relevant** **Not sensitive** **Low**

The species is an active burrower within the substratum. Displacement will probably have

little effect and individuals would be able to re-burrow.

Chemical Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Synthetic compound contamination Insufficient information				Not relevant
Heavy metal contamination Insufficient information				Not relevant
Hydrocarbon contamination Insufficient information				Not relevant
Radionuclide contamination Insufficient information				Not relevant
Changes in nutrient levels Insufficient information				Not relevant
Increase in salinity Hypo and hypersaline water causes tentacle retraction (Smith, 1983). <i>Neopentadactyla mixta</i> lives in fully saline conditions. Reductions in salinity would cause the sea cucumber to stop feeding. A short term reduction in salinity will probably not be serious, particularly if it occurs during a period of torpor within the substratum. Long term reductions in salinity are more problematic. Although the species can tolerate long periods (up to 8 months) without feeding within the substratum, considerable loss of condition occurs during this time. Prevention of feeding for a whole year will probably cause death.	High		High	Moderate
Decrease in salinity				
Changes in oxygenation The species can survive with very low oxygen consumption when buried in the substratum during periods of torpor	Low		Moderate	Moderate

Biological Pressures

	Intolerance	Recoverability	Sensitivity	Confidence
Introduction of microbial pathogens/parasites Insufficient information				Not relevant
Introduction of non-native species Insufficient information				Not relevant
Extraction of this species It is highly unlikely that this species would be extracted for any reason.	Not relevant	Not relevant	Not relevant	Low
Extraction of other species <i>Neopentadactyla mixta</i> frequently lives in maerl beds. The algal nodules form an ideal, coarse, mobile substratum that the sea cucumber can burrow through. Maerl beds are exploited	Intermediate		High	Moderate

commercially. The effects of maerl removal may be less when the sea cucumber is in a state of torpor buried deep within the substratum.

Additional information

Importance review

Policy/legislation

- no data -

★ Status

National (GB)
importance -

Global red list
(IUCN) category -

Non-native

Native -

Origin -

Date Arrived -

Importance information

In suitable coarse, mobile gravel substrata the gravel sea cucumber can reach such high densities that it virtually excludes all other macrofauna. It is possible that *Neopentadactyla mixta* provides the only food source for the temporarily ectoparasitic gastropod *Melanella alba*.

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Datasets

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