

Identification guide of Invasive Alien Species of Union concern

Support for the identification of IAS of Union concern in the framework of a surveillance system

Project task 07.0202/2017/763436/SER/ENV.D2 (v1.1)

Request number: TSSR-2018-09

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Illustrations: Massimiliano Lipperi, Studio Wildart

Myocastor coypus

Coypu, Nutria

Synonyms

None

Species ID

Kingdom: Metazoa

Division: Chordata

Class: Mammalia

Order: Rodentia

Family: Myocastoridae

Genus: *Myocastor*

Species: *Myocastor coypus*

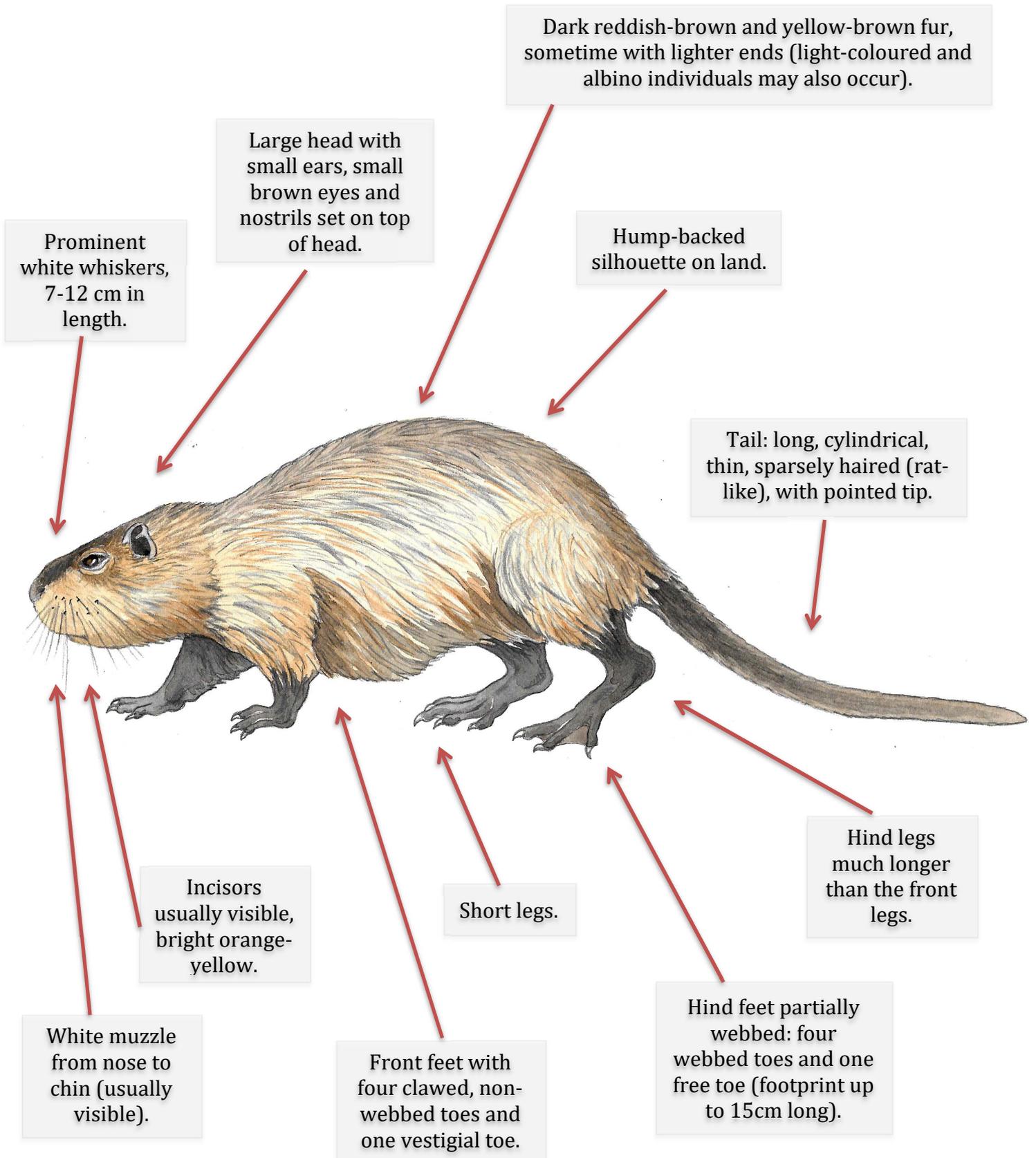
General description:

Medium sized semi-aquatic rodent with dark reddish-brown and yellow-brown fur, sometime with lighter ends (but light-coloured and albino individuals are also known), with distinctive bright orange-yellow front teeth, and a long and heavy rat-like rounded tail (kept still when swimming, as the body is propelled by the feet). Usually found in a wide range of freshwater environments, mostly permanent water bodies, including ponds, drainage canals, rivers, lakes, marshes, and swamps.



Size: Total length head to tail up to 1 meter (tail: 30-45 cm). Weight: 4-6 up to 9 kg

Distinctive characteristics



Similar species

See page 8

Common names

BG	Нутрия
HR	Barska nutrija
CS	Nutrie říční
DA	Bæverrotte
NL	Beverrat
EN	Coypu
ET	Nutria
FI	Rämemajava
FR	Ragondin
DE	Nutria
EL	Μυοκάστορας
HU	Nutria

GA	Francach abhann
IT	Nutria
LV	Nūtrija
LT	Nutrija
MT	-
PL	Nutria
PT	Ratão-d'água
RO	Nutrie
SK	Nutria vodná/riečna
SL	Nutrija
ES	Coipú
SV	Sumpbäver

Key references

Global Invasive Species Database (GISD) 2015. Species profile *Myocastor coypus*. Available from: <http://www.iucngisd.org/gisd/species.php?sc=99> [Accessed 06 October 2018]

Ondatra zibethicus

Muskrat, musquash

Synonyms

Castor zibethicus, *Fiber zibethicus*, *Mus zibethicus*, *Myocastor zibethicus*, *Ondatra americana*, *Ondatra zibethica*

Species ID

Kingdom: Metazoa

Division: Chordata

Class: Mammalia

Order: Rodentia

Family: Muridae

Genus: *Ondatra*

Species: *Ondatra zibethicus*

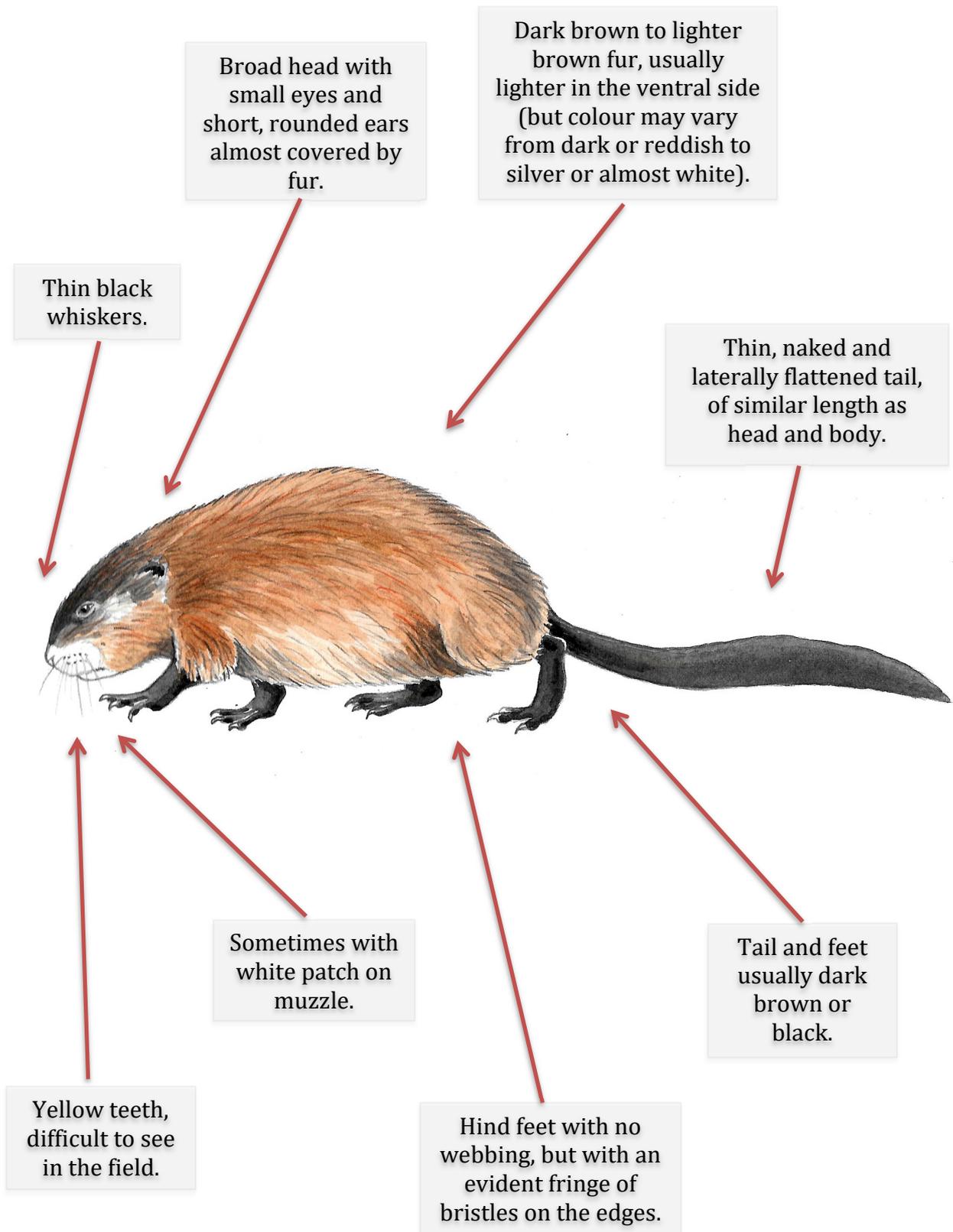
General description:

Small semi-aquatic rodent with dense and typically dark brown to reddish or lighter brown waterproof fur (but colour may vary from dark to almost white). No sexual dimorphism. It is characterised by a distinctive tail, thin and vertically compressed (triangular cross-section), which is used for swimming with rapid serpentine movements. The tail alone may be sufficient to distinguish this species from other similar mammals. The species is also characterised by the presence of perineal musk glands, hence the common English name. Well adapted to a number of freshwater environments, especially with still or slow-moving water (streams, canals, drainage ditches, marshes, ponds, lakes, swamps, and reservoirs), but also on slightly salty water.



Size: Total length head to tail 40-67 cm (tail: 20-28 cm); weight: 0.6-2 kg.

Distinctive characteristics



Similar species

See page 8

Common names

BG	Онδάтра
HR	Bizamski štakor
CS	Ondatra pižmová
DA	Bisamrotte
NL	Muskusrat
EN	Muskrat
ET	Ondatra
FI	Piisami
FR	Rat musqué
DE	Bisamratte
EL	Μοσχοπόντικας
HU	Pézsmarocok

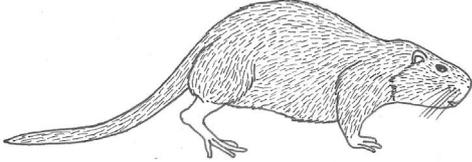
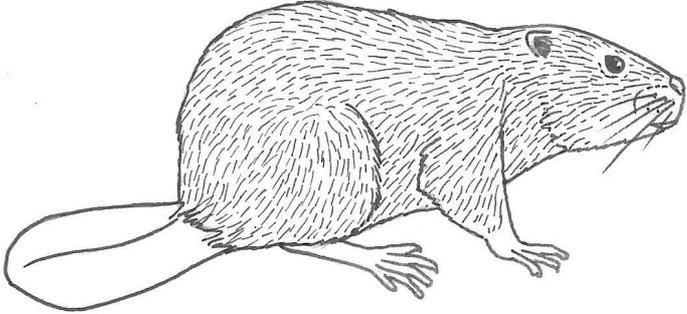
GA	Muscfhreanach
IT	Topo muschiato
LV	Ondatra
LT	Ondatra
MT	-
PL	Piżmak
PT	Rato-almiscarado
RO	Bizam
SK	Ondatra pižmová
SL	Pižmovka
ES	Rata almizclera
SV	Bisam

Key references

CABI, 2018. *Ondatra zibethicus* (muskrat)[original text by Patrick Triplet]. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc.

***Myocastor coypus* and *Ondatra zibethicus* - Similar species**

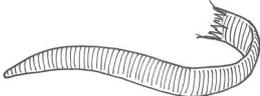
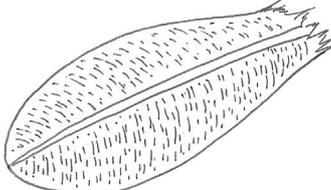
All species are dark brown in colour with large front teeth (otter excluded) that are yellow to orange in colour, which are only visible externally well in coypus. From a distance they can be easily confused. The elements below should help identification in the field.

<p>Muskrat - <i>Ondatra zibethicus</i> Small sized rodent. Muskrats are much smaller than coypu (adults coypus are 2-3 times larger than muskrats, but juveniles are similar in size).</p>	
<p>Coypu - <i>Myocastor coypus</i> Medium size rodent. Coypus are 2-3 times larger than muskrats.</p>	
<p>Beaver¹ - <i>Castor fiber</i> and <i>Castor canadensis</i> Large sized rodent. Beavers are 2 times the size of a coypu.</p>	
<p>Rat - <i>Rattus norvegicus</i> and <i>Rattus rattus</i> Small sized rodent. Rats are much smaller than coypus (but coypus juveniles are similar in size, and smaller than muskrats).</p>	
<p>Otter² - <i>Lutra lutra</i> Medium size carnivore. Body is as long as coypu or a little bit longer (1.5 longer).</p>	
<p>Water vole - <i>Arvicola amphibius</i> Body smaller than muskrat, tail shorter (6-10 cm) compared to body length (12-22 cm), weight 100-300 g.</p>	
<p>American mink - <i>Neovison vison</i> Overall very different shape (similar to the otter, but about half in length). Elongated body, with white patches on chin and throat (usually very small or not present on the upper lip). Very small and no visible incisors, long and slender somewhat flattened tail (13-23cm long, about half body length) and slightly webbed feet. The fur is dark brown to black.</p>	

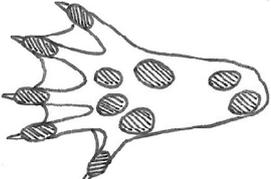
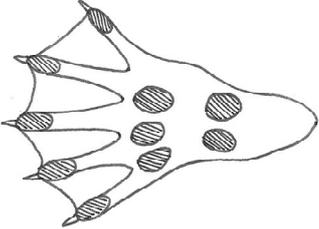
¹ **Beaver:** *Castor fiber* and *C. Canadensis*. The external appearance of the European beaver (*Castor fiber*) is very similar to that of American beaver (*Castor canadensis*) which is also occurring in Europe as a result of introductions

² **Otter:** *Lutra lutra*. Overall very different shape. Elongated body, with a white patch which often extends from muzzle down throat, very small and no visible incisors, long and slender somewhat flattened tail and slightly webbed feet. The fur is brown above and cream below.

Tail

<p style="text-align: center;">Muskrat <i>Ondatra zibethicus</i> Long, laterally flattened, thin tail.</p>	
<p style="text-align: center;">Coypu <i>Myocastor coypus</i> Long, rounded and sparsely haired rat-like tail.</p>	
<p style="text-align: center;">Beaver <i>Castor fiber</i> and <i>Castor canadensis</i> Large and broad flat tail, almost hairless.</p>	
<p style="text-align: center;">Rat <i>Rattus norvegicus</i> and <i>Rattus rattus</i> Long naked tail.</p>	
<p style="text-align: center;">Otter <i>Lutra lutra</i> Thin robust tail, thicker at base.</p>	

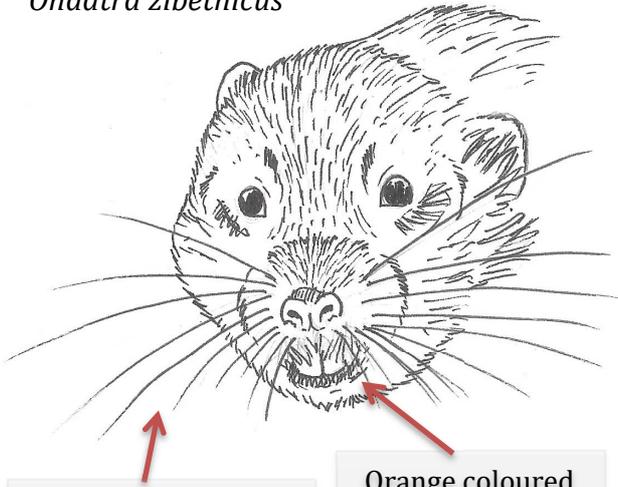
Hind Feet

<p style="text-align: center;">Muskrat <i>Ondatra zibethicus</i> Hind feet not webbed but with an evident fringe of hairs.</p>	
<p style="text-align: center;">Coypu <i>Myocastor coypus</i> Partially webbed hind feet.</p>	
<p style="text-align: center;">Beaver <i>Castor fiber</i> and <i>Castor canadensis</i> Fully webbed hind feet.</p>	
<p style="text-align: center;">Rat <i>Rattus norvegicus</i> and <i>Rattus rattus</i> No webbing in hind feet.</p>	
<p style="text-align: center;">Otter <i>Lutra lutra</i> Slightly webbed feet.</p>	

Teeth and Whiskers

Muskrat

Ondatra zibethicus

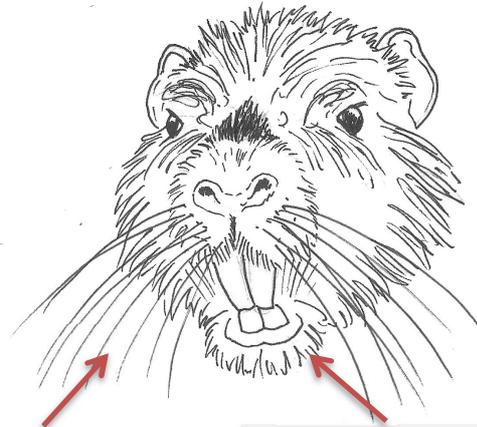


Dark thin whiskers.

Orange coloured teeth, not visible.

Coypu

Myocastor coypus

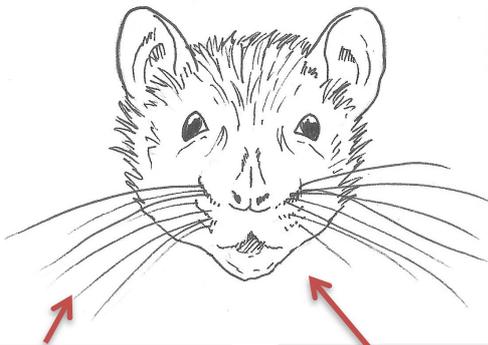


Long, evident white whiskers.

Large incisors bright yellow-orange.

Rat

Rattus norvegicus and *Rattus rattus*

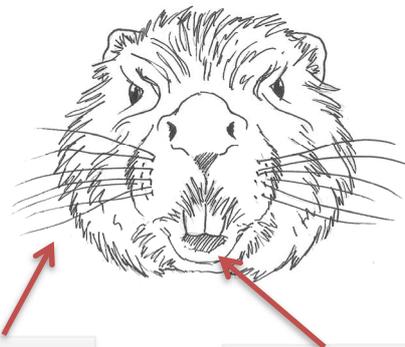


Black and white long whiskers

Incisors yellow-brown.

Beaver

Castor fiber and *Castor canadensis*

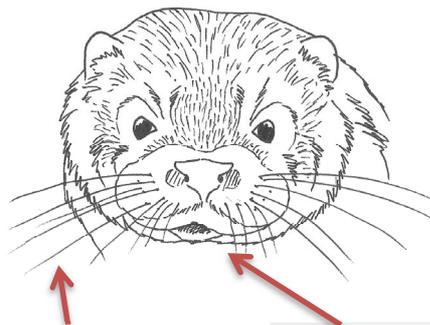


Dark thin whiskers.

Large orange incisors.

Otter

Lutra lutra



Long evident mostly white whiskers.

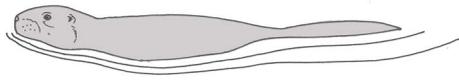
Less developed and white incisors.

Swimming

Muskrat

Ondatra zibethicus

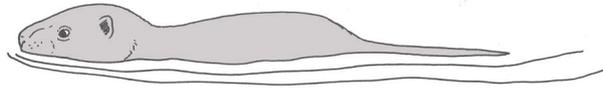
When swimming much of the body emerges.



Coypu

Myocastor coypus

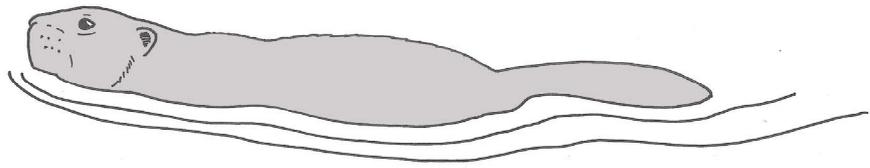
When swimming much of the body emerges.



Beaver

Castor fiber and *Castor canadensis*

When swimming on the water surface, the body is visible from head to tail. The tail is used to drive power, manoeuvre, and dive while swimming, and is often visible on the surface.



Rat

Rattus norvegicus and *Rattus rattus*

When swimming much of the body emerges.



Otter

Lutra lutra

When swimming only the head and neck are kept above the water's surface. Can dive.

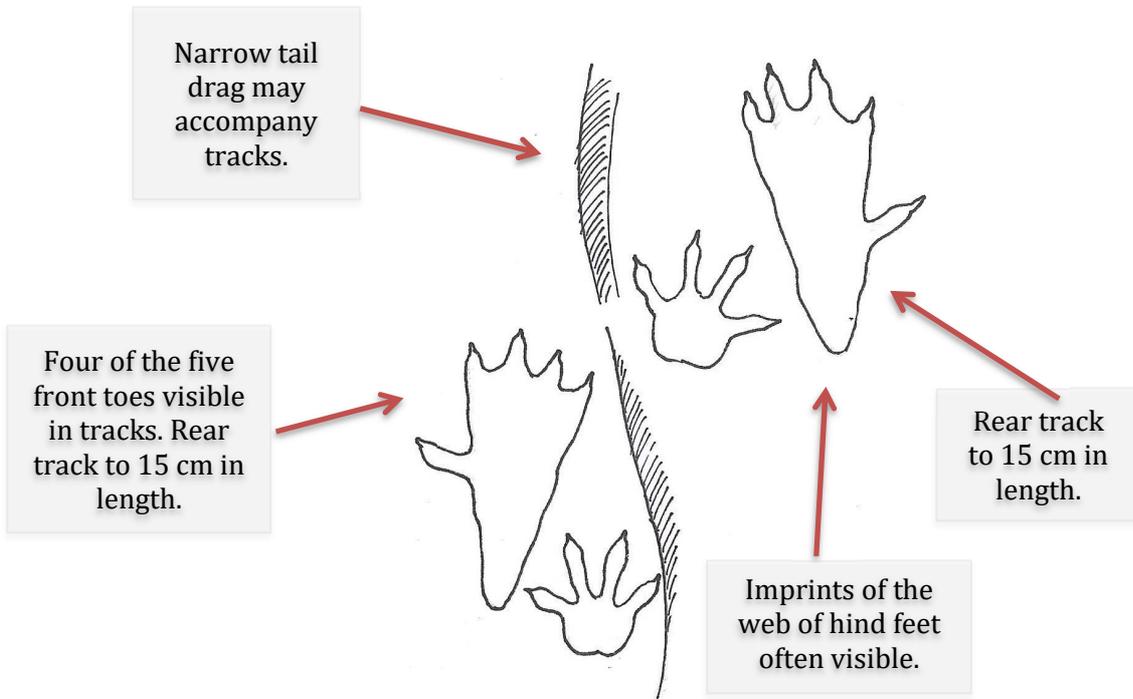


Signs of presence

Tracks and Runs

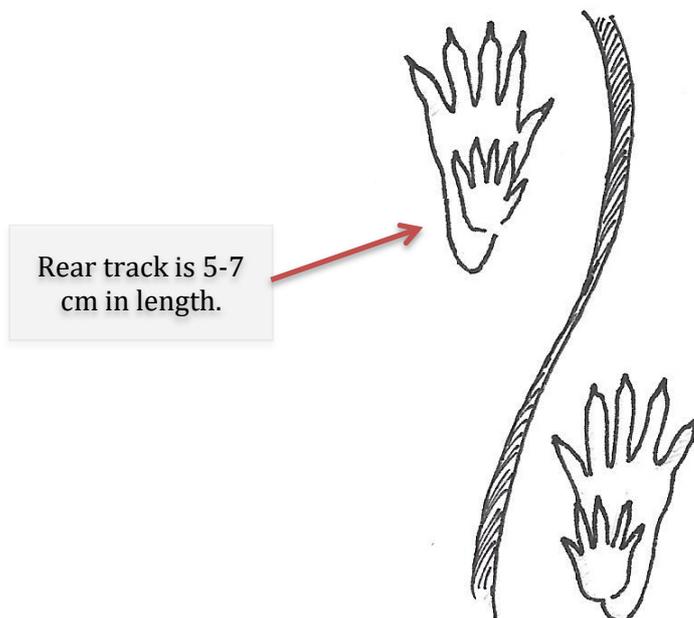
Coypu

Myocastor coypus

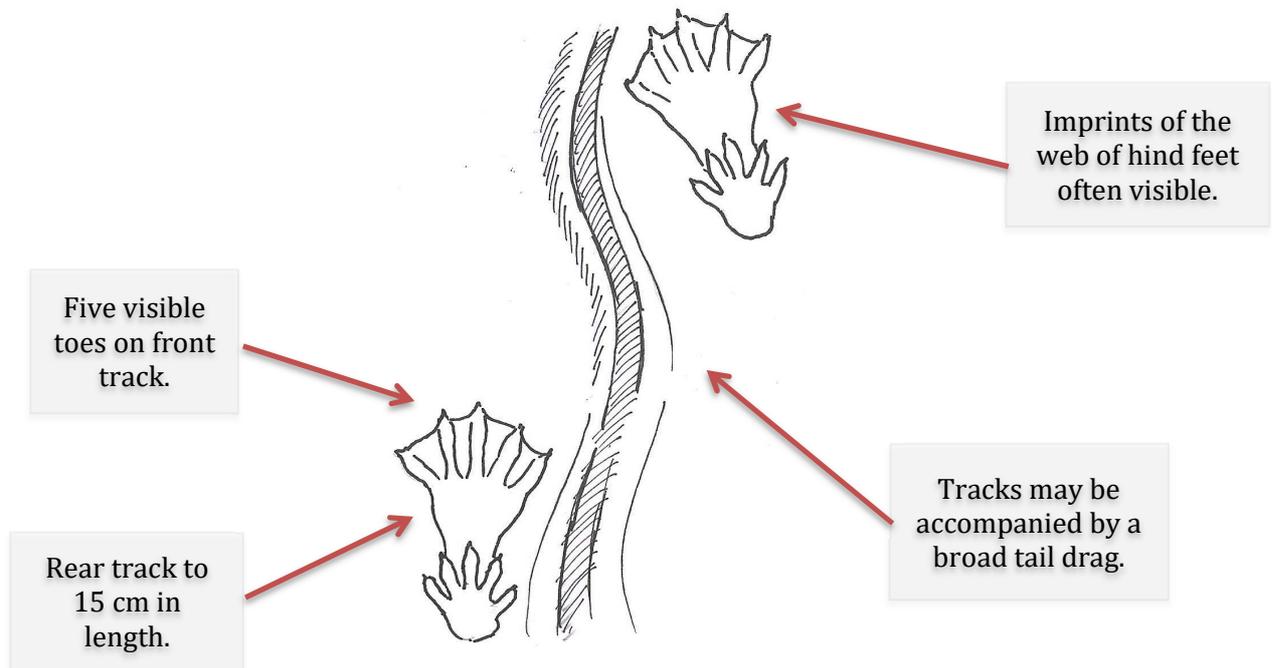


Muskrat

Ondatra zibethicus

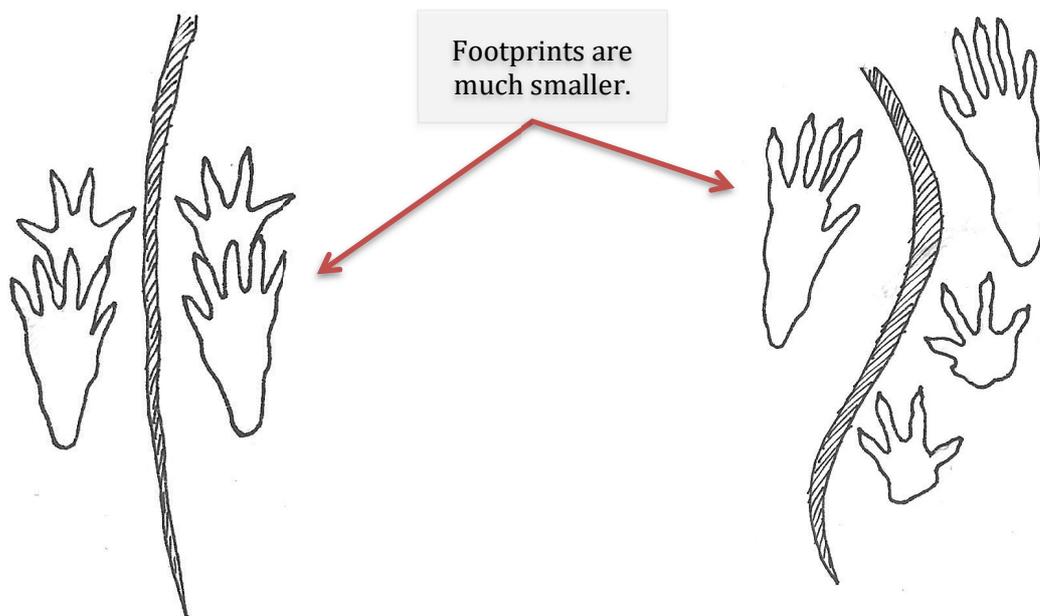


Beaver
Castor fiber and Castor canadensis

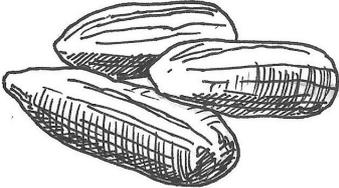


Water vole
Arvicola amphibius

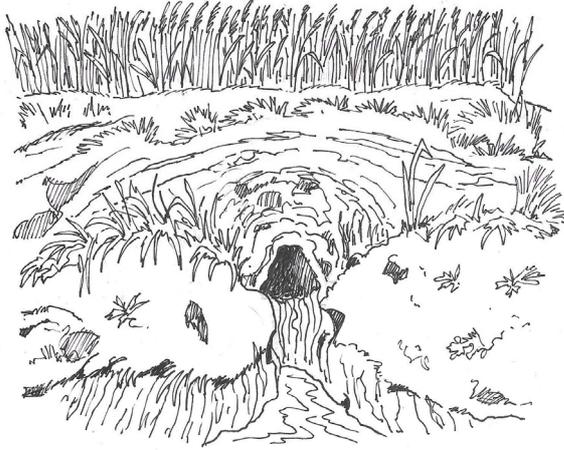
Rat
Rattus norvegicus and Rattus rattus



Runs			
<p>Coypu <i>Myocastor coypus</i></p>	<p>Muskrat <i>Ondatra zibethicus</i></p>	<p>Water vole <i>Arvicola amphibius</i></p>	<p>Beaver <i>Castor fiber</i> and <i>Castor canadensis</i></p>
<p>Paths through vegetation about 15-20 cm wide.</p>	<p>Paths through vegetation about 10 cm wide.</p>	<p>Paths through vegetation very narrow.</p>	<p>Paths through vegetation about 38 to 50 cm wide</p>

Scat	
<p>Coypu <i>Myocastor coypus</i></p> <p>Large droppings, cylindrical form, up to 70mm long, with fine longitudinal striations.</p>	
<p>Muskrat <i>Ondatra zibethicus</i></p> <p>Small droppings oval elongated form, 10-12 mm in length (diameter: 4-5 mm), usually deposited in clusters.</p>	
<p>Water vole <i>Arvicola amphibius</i></p> <p>Latrines are similar to muskrat: flattened piles of droppings topped with fresh ones. Droppings are cylindrical with blunt ends, usually 12mm long and 4-5mm wide.</p>	
<p>Rat <i>Rattus norvegicus</i> and <i>Rattus rattus</i></p> <p>Droppings are similar to those of muskrat, but scattered not in latrines.</p>	

Dens



Coypu

Myocastor coypus

Digs dens in ditches and river banks.



Muskrat *Ondatra zibethicus*

Builds dome-shaped lodges, made of marsh vegetation and mud with underground entrances (smaller than beaver lodges) and digs in stream or pond banks.



Beaver

Castor fiber and *Castor canadensis*

Builds dome-shaped lodges made of sticks and logs and digs into a stream bank. They could build dams to regulate water depth.



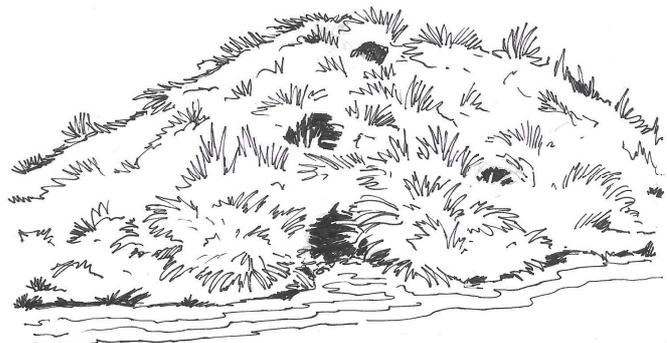
Water vole *Arvicola amphibius*

Digs small burrows (4-8 cm at the entrance) in the bank



Rat *Rattus norvegicus* and *Rattus rattus*

Digs small burrows (4-8 cm at the entrance) in the bank, similar to those of water vole



Myriophyllum aquaticum

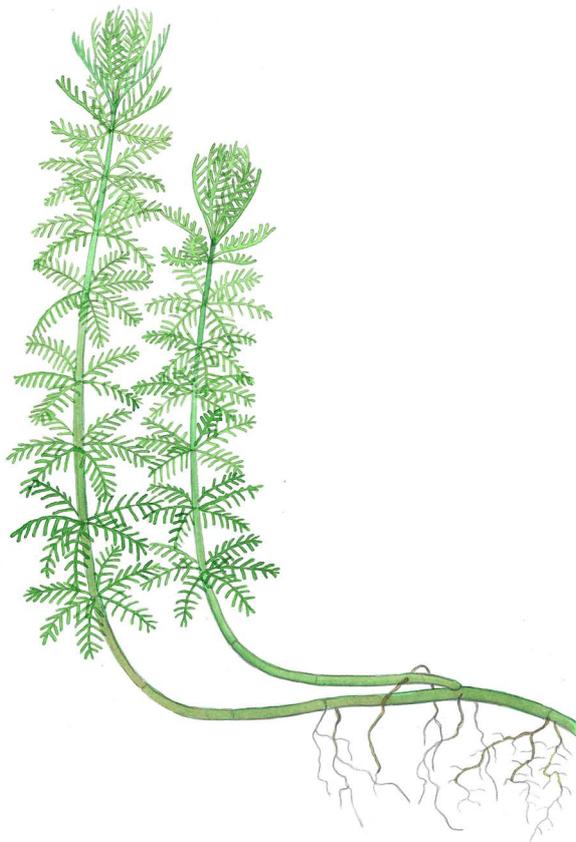
Parrot's feather, parrot feather watermilfoil

Synonyms

Enydria aquatica Vell., *Myriophyllum brasiliense* Cambess., *Myriophyllum proserpinacoides* Gillies ex Hook. & Arn.

Species ID

Kingdom: Plantae
Phylum: Tracheophyta
Class: Spermatopsida
Order: Saxifragales
Family: Haloragidaceae
Genus: *Myriophyllum*
Species: *Myriophyllum aquaticum*

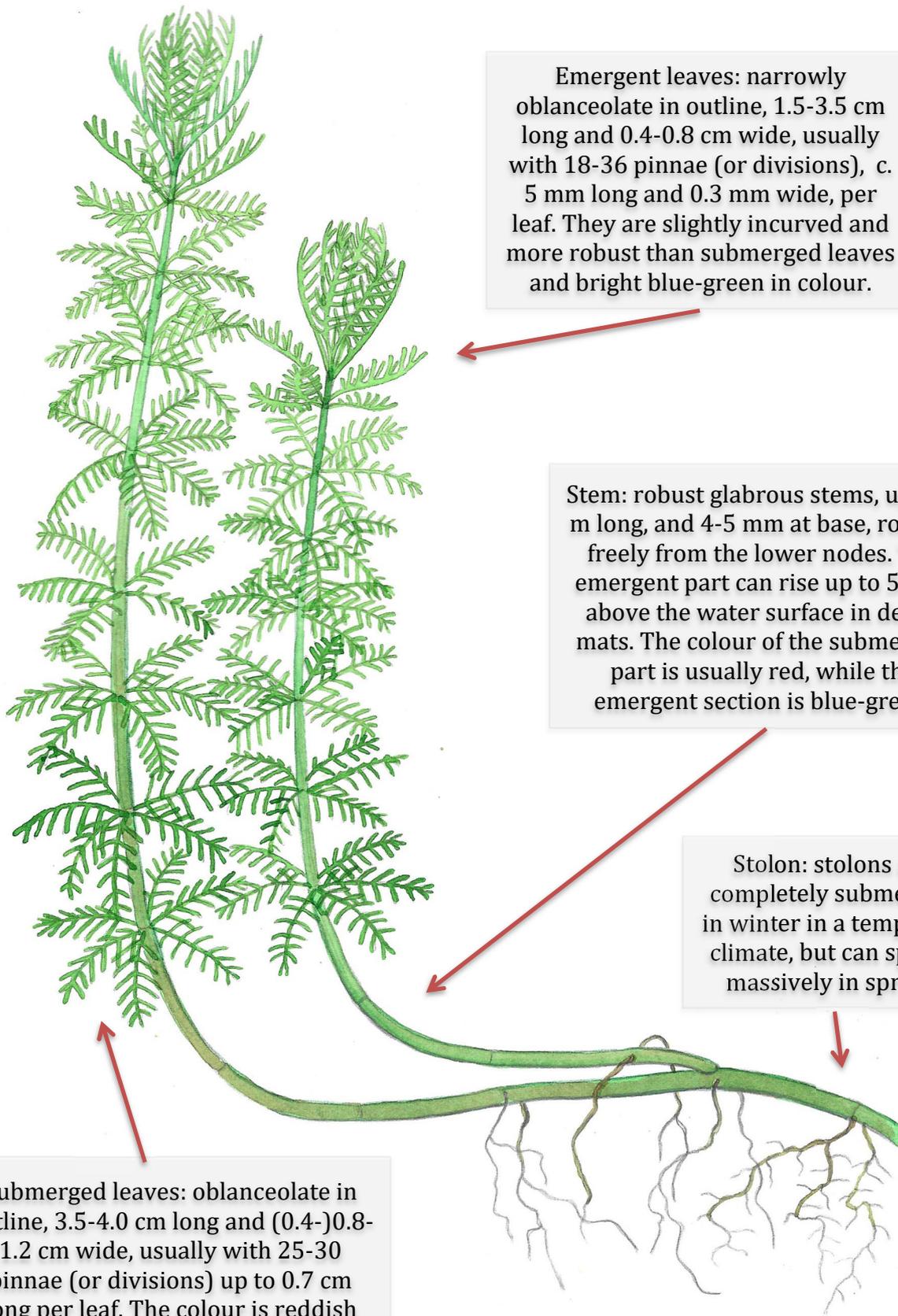


General description:

A dioecious aquatic or amphibic plant glaucous green in colour, characterised by submerged and emergent stems, which may extend from banks, or from deep waters, forming dense entangled mats. It is characterised by featherlike leaves in whorls of 4-6. Leaf stiffness and dimensions differ considerably depending on whether they grow in the emerged or submerged part of the plant. Another distinctive trait is the typical shape of emergent stems and leaves looking like miniature pine or fir trees. It can be found in a number of freshwater environments, particularly in still or slowly flowing waters rich in nutrients, such as lakes, marshes, ponds, streams and canals with muddy substrates (but also in banks, and muddy grounds near water).

Size: Stems (2-)3-4(-5) m in length, submerse leaves 3.5-4.0 cm long, (0.4)0.8-1.2 cm wide, emerse leaves (1.5-)2.5-3.5 cm long, (0.4-)0.7-0.8 cm wide

Distinctive characteristics

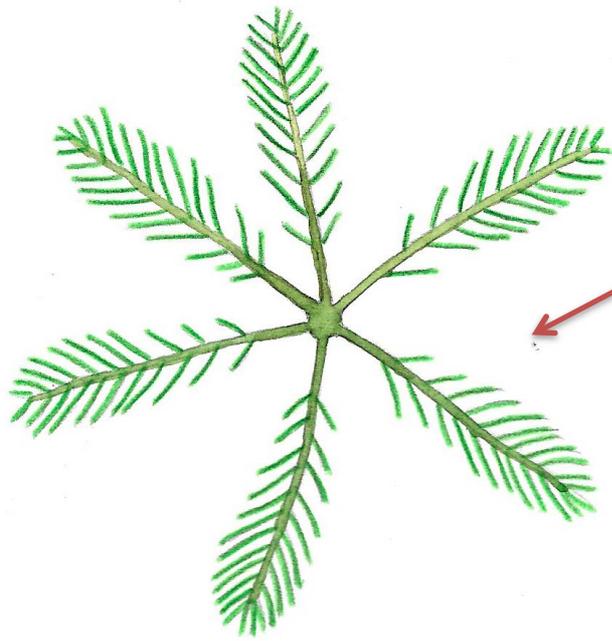


Emergent leaves: narrowly oblanceolate in outline, 1.5-3.5 cm long and 0.4-0.8 cm wide, usually with 18-36 pinnae (or divisions), c. 5 mm long and 0.3 mm wide, per leaf. They are slightly incurved and more robust than submerged leaves and bright blue-green in colour.

Stem: robust glabrous stems, up to 4 m long, and 4-5 mm at base, rooting freely from the lower nodes. The emergent part can rise up to 50 cm above the water surface in dense mats. The colour of the submerged part is usually red, while the emergent section is blue-green.

Stolon: stolons are completely submerged in winter in a temperate climate, but can sprout massively in spring.

Submerged leaves: oblanceolate in outline, 3.5-4.0 cm long and (0.4-)0.8-1.2 cm wide, usually with 25-30 pinnae (or divisions) up to 0.7 cm long per leaf. The colour is reddish orange or green. They may rapidly decay leaving bare sections of stems.



Leaves: oblanceolate in outline and pectinate, 3.5-4.0 cm long and 0.4-1.2 cm wide, arranged around the stem in whorls of 4-6. They are usually more densely packed upward.

Inflorescence: very small, inconspicuous, axillary, indeterminate spike with unisexual flowers just above emergent leaves, subtended by 2 bracteoles.

Female flowers: on very short pedicels in the upper leaf axils, between 2 small bracts. Characterised by 4 white, deltoid, denticulate sepals (size: 0.4-0.5 mm long and 0.3 mm wide) and prominent stigmas with numerous fine white hairs. Petals absent. Pyriform ovary, 0.6-0.7 mm long, 0.6 mm wide, longitudinally ribbed between sepals.



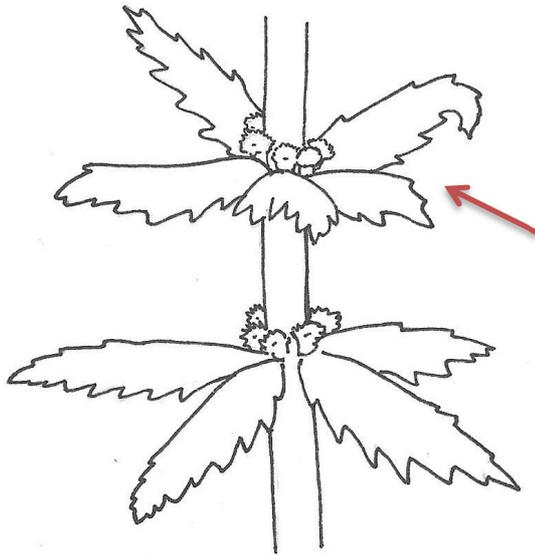
Fruit: not observed in Europe.

Male flowers: There are no male plants present in Europe.

Similar species

In Europe the species cannot be mistaken for any other aquatic or riparian plant by its mat forming habit and whorls of glaucous featherlike leaves.

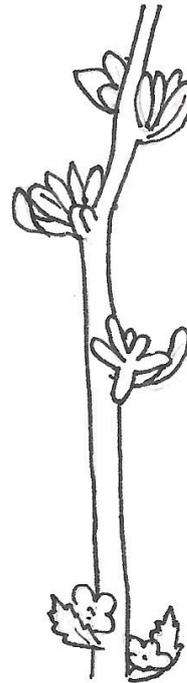
Myriophyllum heterophyllum



Bracts entire and toothed whorls of 4-5

Length of internodes: 1/4 length of leaves (length of internodes relates to the submerge leaves)

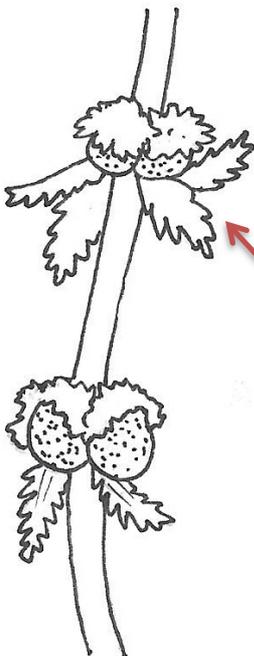
Myriophyllum alterniflorum



Flowers alternate

Length of internodes: Same length as leaves (length of internodes relates to the submerge leaves)

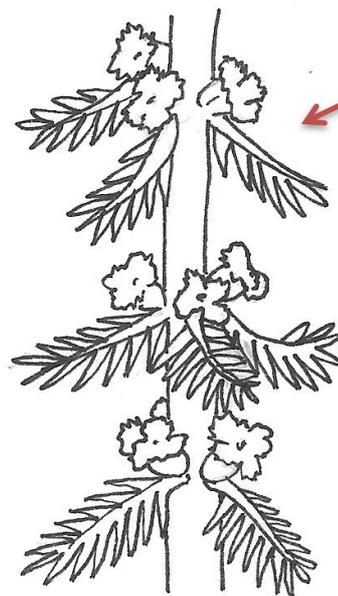
Myriophyllum spicatum



Serrated bracts

Length of internodes: Same length as leaves (length of internodes relates to the submerge leaves)

Myriophyllum verticillatum



Flowers white, pectinate bracts bent downwards

Length of internodes: 1/2 length of leaves (length of internodes relates to the submerge leaves)

Common names

BG	Мирофилум (genus name)
HR	Vodeni krocanj
CS	Stolístek vodní
DA	Papegøjefjer
NL	Parelvederkruid
EN	Parrot's feather
ET	Brasiilia vesikuusk
FI	Isoärviä
FR	Myriophylle aquatique
DE	Brasilianisches Tausendblatt
EL	-
HU	Strucctoll-süllőhínár

GA	Líonán cleiteach
IT	Millefoglio d'acqua
LV	-
LT	Stambioji plunksnalapė
MT	-
PL	Wywłócznik brazylijski
PT	Milefólio-aquático
RO	-
SK	Stolístok vodný
SL	Brazilski rmanec
ES	Cola de zorro acuática
SV	Storslinga

Key references

CABI, 2018. *Myriophyllum aquaticum*. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc

Orchard AE, 1981. A revision of South American *Myriophyllum* (Haloragaceae) and its repercussions on some Australian and North American species. *Brunonia*, 4:27-65.

<http://www.q-bank.eu/Plants/lookalikes/Myriophyllum/Myriophyllum.HTML>

http://keys.lucidcentral.org/keys/v3/aquatic_plants/

Myriophyllum heterophyllum

Various-leaved water-milfoil, two-leaf watermilfoil

Synonyms

None

Species ID

Kingdom: Plantae

Phylum: Tracheophyta

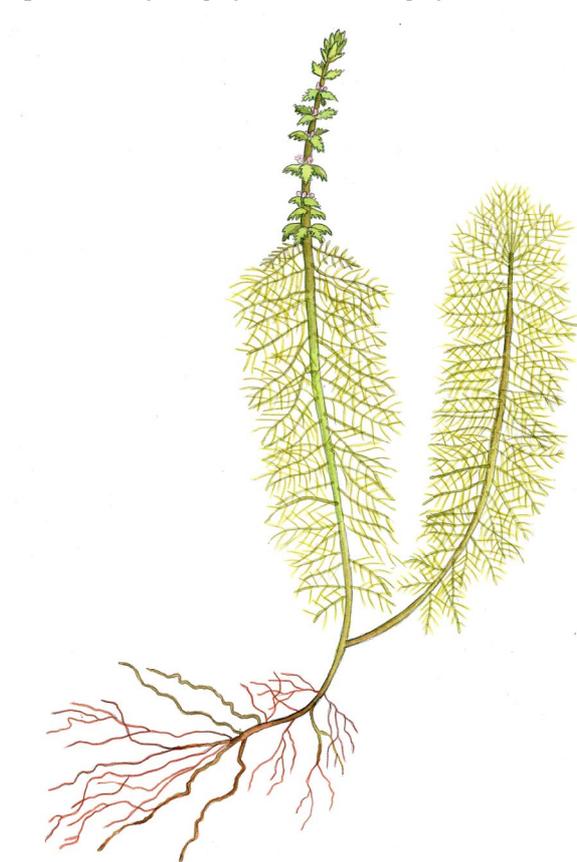
Class: Spermatopsida

Order: Saxifragales

Family: Haloragidaceae

Genus: *Myriophyllum*

Species: *Myriophyllum heterophyllum*



General description:

A perennial evergreen submerged aquatic herb, having both submerged and emergent leaf forms. Submerged leaves are feather-like and pinnate (2–5 cm long and 2–4 cm wide). Each leaf has 8–22 pinnae. Emergent leaves can take two forms, either a terrestrial form (pinnately dissected), which is expressed when growing on damp mud, or an emergent leaf form (entire toothed) on a stem on which flowers are produced. Emergent leaves are variable in both shape and structure, 4–30 mm long, 1.5–3 mm wide and stiff in texture. May occur in a number of freshwater environments, particularly in shallow and slow-moving waters like lakes, ponds, rivers and swamps, but also in semi-terrestrial conditions, e.g. stranded on muddy grounds, but this is merely a survival strategy.

Size: Stem up to several meters in length, depending on water depth and stream velocity

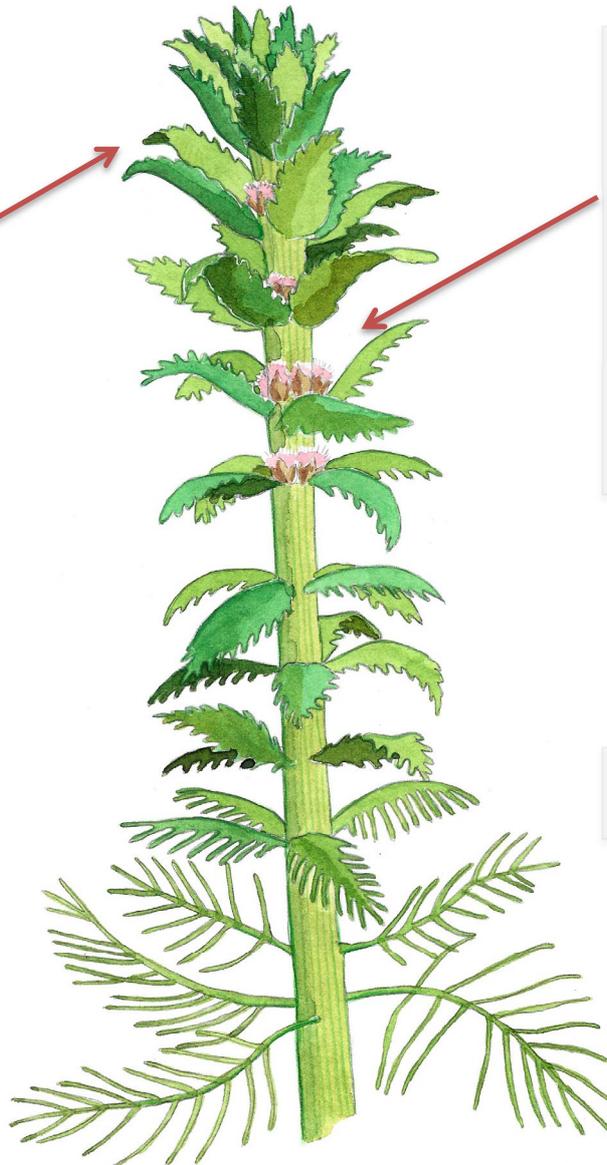
Disclaimer: *Myriophyllum* species are reportedly difficult to identify based only on their morphology. Identification relies mostly on characters of flowers and fruits, which may not be present on these plants, as they rarely flower. Hence, genetic identifications may be required.

Distinctive characteristics

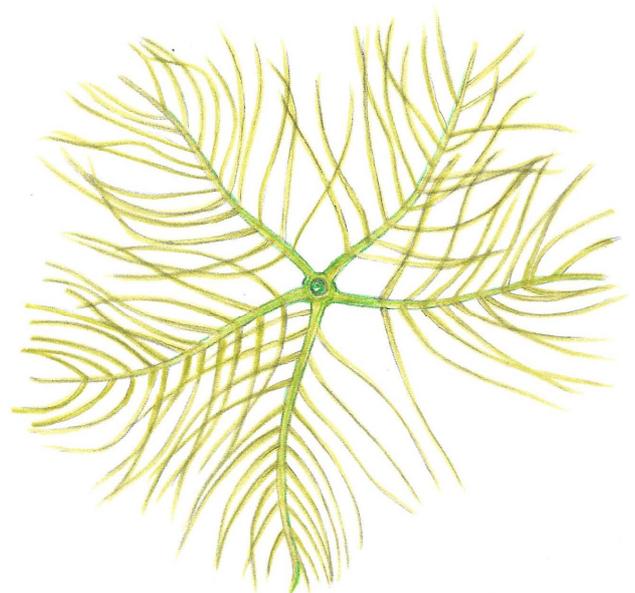
Emergent leaves: leaves in the emergent shoot bearing flowers are actually bracts, bright-green, stiff, undivided, serrated to toothed, 0.4-3 cm long and 1.5-5 mm wide, very variable in both shape and structure.

Flowers: very tiny (about 1 mm long) and grow in whorls of 4 in emergent terminal spikes of 5-15(-35 cm) in length. In the native range with female flowers below, hermaphrodite flowers in the middle and male ones at the top. So far in Europe only female flowers, reddish in colour, observed.

Fruits: None observed in Europe



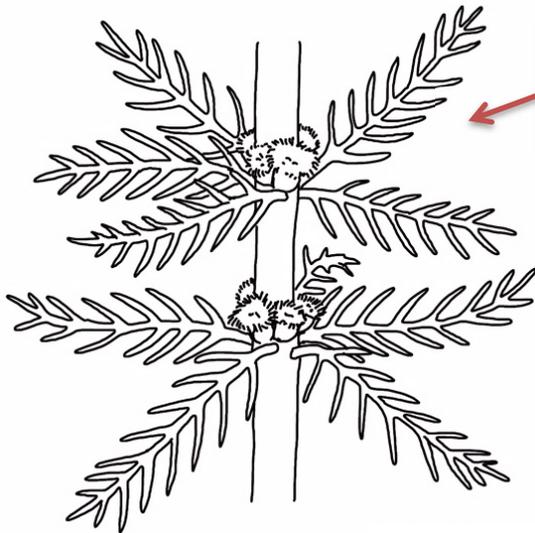
Submerged leaves: green, feather-like and pinnate, arranged into pseudowhorls of 4-5 leaves, 2-5 cm long and 2-4 cm wide. Deeply divided: 8-22 pinnae (or division) per leaf.



Similar species

In Europe, the species can be distinguished when flowering by its entire and toothed bracts in whorls of 4-5.

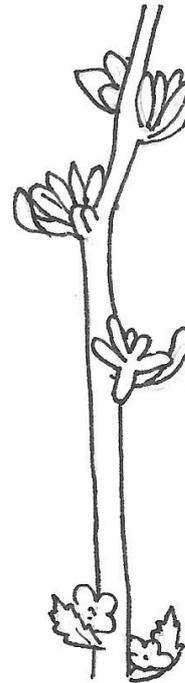
Myriophyllum aquaticum



Leaves pectinate in whorls of 4-6

Length of internodes: 1/2 length of leaves (length of internodes relates to the submersed leaves)

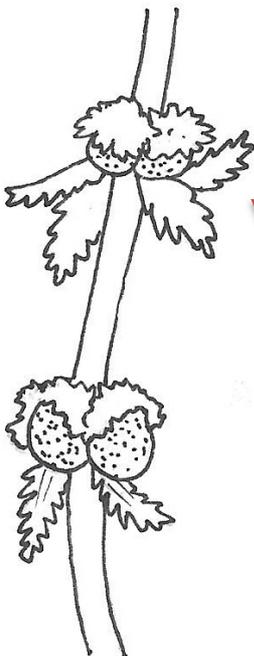
Myriophyllum alterniflorum



Flowers alternate

Length of internodes: Same length as leaves (length of internodes relates to the submersed leaves)

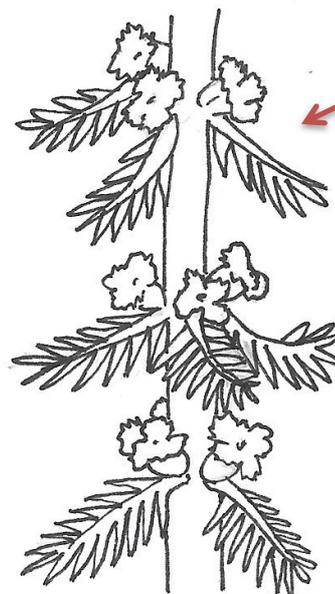
Myriophyllum spicatum



Serrated bracts

Length of internodes: Same length as leaves (length of internodes relates to the submersed leaves)

Myriophyllum verticillatum



Flowers white, pectinate bracts bent downward

Length of internodes: 1/2 length of leaves (length of internodes relates to the submersed leaves)

Common names

BG	-
HR	-
CS	Stolístek různolistý
DA	Forskelligbladet tusindeblad
NL	Ongelijkbladig vederkruid
EN	Broadleaf watermilfoil
ET	Erilehine vesikuusk
FI	Kampaarviä
FR	Myriophylle hétérophylle
DE	Verschiedenblättriges Tausendblatt
EL	-
HU	Felemáslevelű süllőhínár

GA	-
IT	Millefoglio d'acqua eterofillo
LV	-
LT	Kaičioji plunksnalapė
MT	-
PL	Wywłócznik różnolistny
PT	-
RO	-
SK	Stolístek různolistý
SL	Raznolistni rmanec
ES	-
SV	Kamslinga

Key references

CABI, 2018. *Myriophyllum heterophyllum*. In: Invasive Species Compendium. Wallingford, UK: CAB International. www.cabi.org/isc

<http://www.q-bank.eu/Plants/lookalikes/Myriophyllum/Myriophyllum.HTML>
http://keys.lucidcentral.org/keys/v3/aquatic_plants/

EPPO, 2016. Data sheets on pests recommended for regulation/Fiches informatives sur les organismes recommandés pour réglementation: *Myriophyllum heterophyllum* Michaux. Bulletin OEPP/EPPO Bulletin (2016) 46 (1), 20–24

Orconectes limosus

Spiny-cheek crayfish

Synonyms

Faxonius limosus

Species ID

Kingdom: Metazoa

Division: Arthropoda

Class: Malacostraca

Order: Decapoda

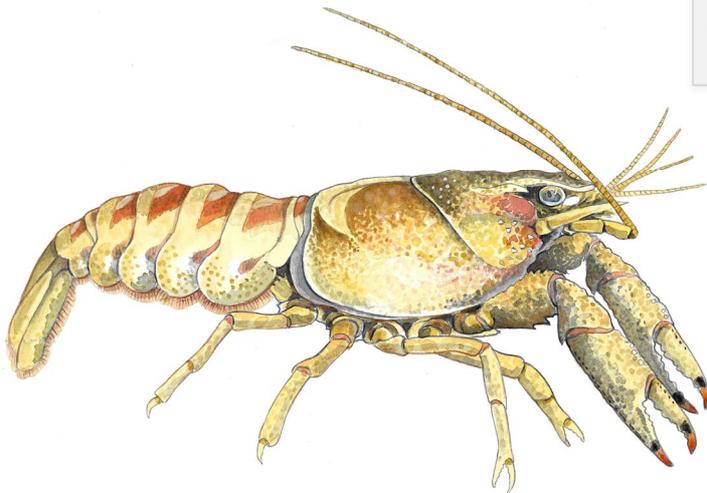
Family: Cambaridae

Genus: *Orconectes*³

Species: *Orconectes limosus*

General description:

Medium-sized crayfish, characterised by transverse reddish-brown bands across the abdominal segments and on pleura. Other distinctive features are the presence of sharp hepatic spines on the side of the carapace in front of the cervical groove (hence the common English name) and the tip of the chelae orange and black. Usually found in a wide range of freshwater environments, including temporary and polluted habitats which the species can tolerate pretty well.



Size: Total body length up to 12 cm.

Disclaimer: Species identification may be difficult for non-experts and laypeople, hence it is usually recommended to contact an expert. In general, for correct identification, the animals need to be captured because the distinctive characteristics are not always visible from a distance and may be not well developed (particularly in juveniles). In some cases, identification may require specific checks, e.g. spines or male gonopod morphology (which can require the use of microscope).

³ This species underwent a reclassification in August 2017, changing the genus *Orconectes* to *Faxonius* (Crandall and De Grave 2017). Crandall, K.A. and S. De Grave. 2017. An updated classification of the freshwater crayfishes (Decapoda: Astacidea) of the world, with a complete species list. *Journal of Crustacean Biology* 37(5):615-653. <https://doi.org/10.1093/jcobiol/rux070>.

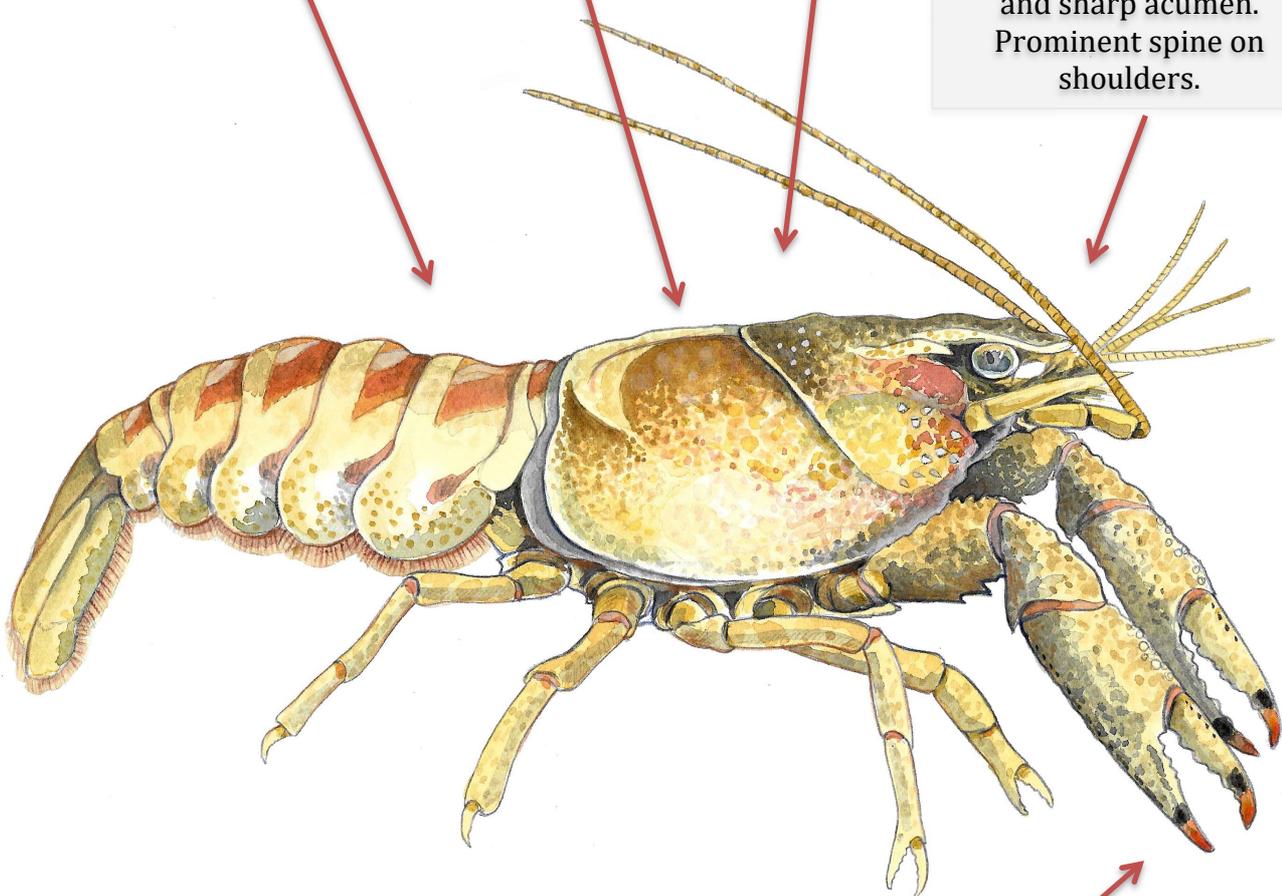
Distinctive characteristics

Carapace: colour varies from pale to olive or dark brown (sometimes bluish-brown too), with a transverse brown-red band across on both abdominal segments and pleura.

Carapace: relatively smooth, with some prominent hepatic spines on sides of anterior carapace (in front of the cervical groove and the cephalic area).

Areola prominent.

Rostrum: smooth and elongated, with nearly parallel edges, single long post-orbital ridge (with distal spine), median carina absent, and a long and sharp acumen. Prominent spine on shoulders.

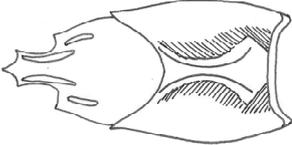
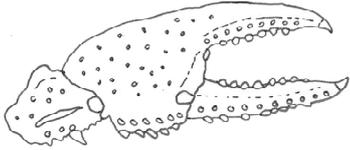
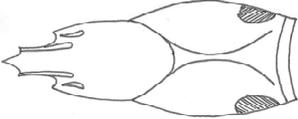
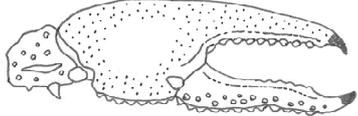
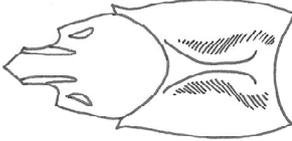
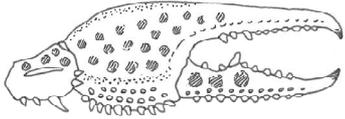


Chelae: strong and smooth, characterised by regular rows of small light-coloured tubercles along margins of hand and moveable finger, and by the tips coloured in orange followed by a black band. Ventral side with lighter colour. Lost claws can regenerate in a smaller size. Prominent spur on inner side of carpus.

Signs of presence

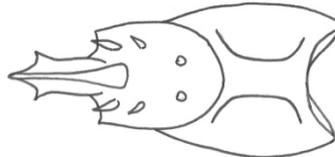
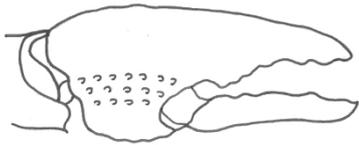
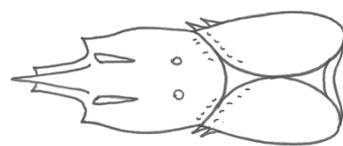
Burrows in banks of water bodies (not diagnostic and described only in England so far). Parts of dead animals including claws and body shell can be found near their habitats or discarded by predators, e.g. in bird or mammal nests. However, identification depends on overall quality of body remains.

Similar species

	Carapace	Chelae
<i>Orconectes virilis</i>	 <p>Rostrum without median carina. Parallel margins. Open areola.</p>	 <p>Broad and flat, with straight margin on movable finger. Rows of tubercles. May be blue in colour.</p>
<i>Orconectes rusticus</i>⁴	 <p>Rostrum without median carina. Open areola. Dark, rusty spots on either side of its carapace.</p>	 <p>Dark rusty spots. Tubercles not in rows. Oval gap when closed.</p>
<i>Orconectes immunis</i>	 <p>No hepatic spines on lateral margins of carapace. Typical pale bands running along dorsal surface of abdomen.</p>	 <p>Broad, flattened tuberculate chela, with straight margin of movable finger.</p>

⁴ Some risk of confusion may exist with *Orconectes juvenilis*, a species phenotypically similar to *Orconectes rusticus* (see this species description) recently found in France. In fact, in France, *O. juvenilis* was initially misidentified with *O. rusticus* and only the gonopod and genetic analyses led to the correct identification. Thus, in case of doubts, an expert is needed to confirm the identification.

Other species alien to Europe

	Carapace	Chelae
<i>Procambarus fallax</i> <i>f. virginalis</i>	 <p>Open areola.</p>	 <p>Very small, weakly granulate.</p>
<i>Pacifastacus leniusculus</i>	 <p>Rostrum with median carina. Large areola.</p>	 <p>Robust and smooth, with white turquoise patch on top of junction of fingers.</p>
<i>Procambarus clarkii</i>	 <p>No areola.</p>	 <p>S-shaped, covered with small bumps.</p>

Common names

BG	Американски шипобузест рак
HR	Bodljobradi rak
CS	Rak pruhovaný
DA	Amerikansk flodkrebs
NL	Gevlekte Amerikaanse rivierkreeft
EN	Spinycheek crayfish
ET	Ogarõskne vähk
FI	Amerikankääpiöraju
FR	Écrevisse américaine
DE	Kamberkrebs
EL	Ποταμοκαραβίδα της Αμερικής
HU	Cifrarák

GA	-
IT	Gambero americano
LV	Dzelonvaigu vēzis
LT	Rainuotasis vėžys
MT	-
PL	Rak pręgowany
PT	Lagostim-dos-canais
RO	Racul dungat
SK	Rak pruhovaný
SL	Trnavec
ES	Cangrejo de los canales
SV	Amerikansk dvärgkräfta

Key references

Pockl M; Holdich D; Pennerstorder J, 2006. Identifying native and alien crayfish species in Europe. Melk, Austria: European Project CRAYNET, Guglar Cross Media, 47.

Souty-Grosset C, Holdich D, Noël O, Reynolds J, Haffner P(eds), 2006. Atlas of crayfish in Europe. Museum National d'Histoire Naturelle, Paris

Orconectes virilis

Virile crayfish, Northern crayfish

Synonyms

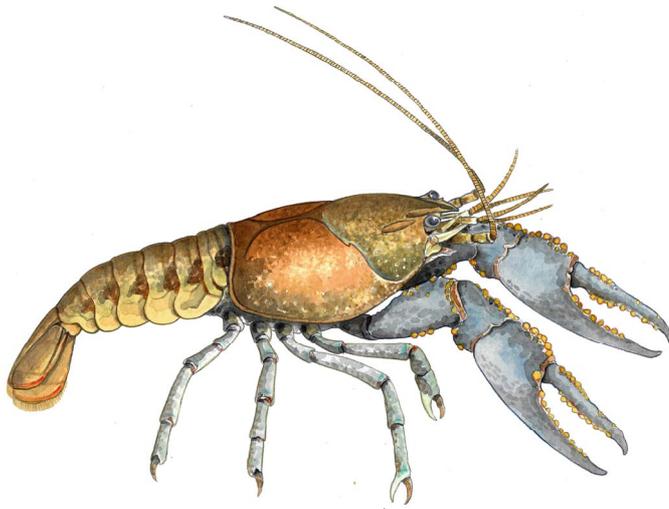
Cambarus virilis, *Cambarus debilis*,
Cambarus wisconsinensis, *Cambarus*
couesi, *Faxonius virilis*

Species ID

Kingdom: Metazoa
Division: Arthropoda
Class: Malacostraca
Order: Decapoda
Family: Cambaridae
Genus: *Orconectes*⁵
Species: *Orconectes virilis*

General description:

Medium-sized crayfish, typically brown or olive green in colour. The species name in English derives from the male sexual organs, the copulatory stylets, characterised by long white hair-like structures. Can be found in a range of freshwater environments (e.g. streams, rivers, canals, ponds and lakes, even in deep water), and is known to build extensive burrow networks in the banks of rivers.



Size: Total body length up to 13 cm (but usually less than 10 cm).

Disclaimer: Species identification may be difficult for non-experts and laypeople, hence it is usually recommended to contact an expert. In general, for correct identification, the animals need to be captured because the distinctive characteristics are not always visible from a distance and may be not well developed (particularly in juveniles). In some cases, identification may require specific checks, e.g. spines or male gonopod morphology (which can require the use of microscope).

⁵ This species underwent a reclassification in August 2017, changing the genus *Orconectes* to *Faxonius* (Crandall and De Grave 2017). Crandall, K.A. and S. De Grave. 2017. An updated classification of the freshwater crayfishes (Decapoda: Astacidea) of the world, with a complete species list. *Journal of Crustacean Biology* 37(5):615-653. <https://doi.org/10.1093/jcobiol/rux070>.

Distinctive characteristics

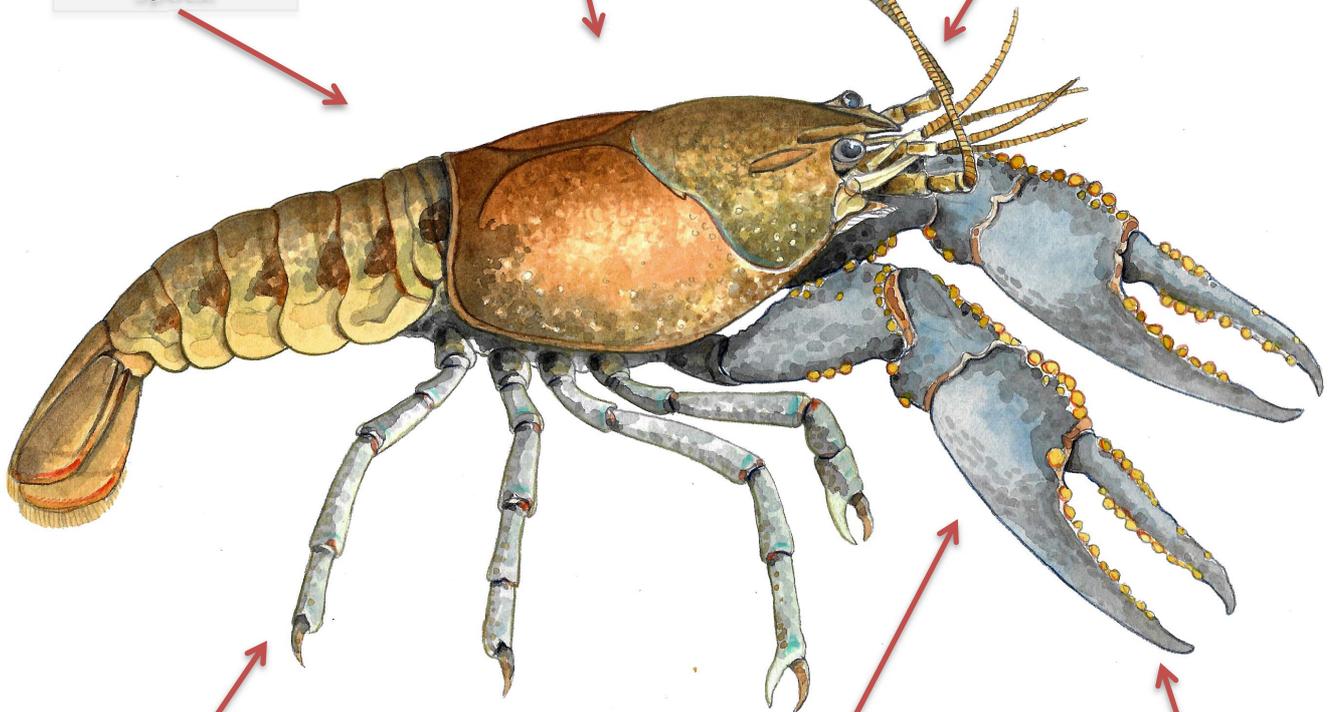
Carapace: typically smooth, green-brown to brown in colour, with a row of tubercles on shoulders behind cervical groove (one with prominent spine). No hepatic spine.

Body green-brown to brown.

Areola: very narrow.

Rostrum: less pronounced than *F. limosus*, smooth and elongated, with nearly parallel edges, one pair post-orbital ridges, median carina absent, and a long and sharp acumen. Prominent spine on shoulders.

Abdomen: no longitudinal or transverse bands but may have dark brown medial spots.



Chelae: light orange or yellow tips, without black band.

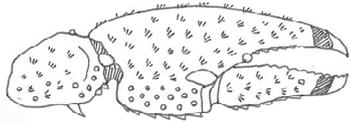
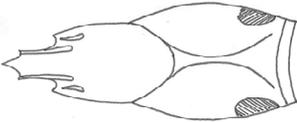
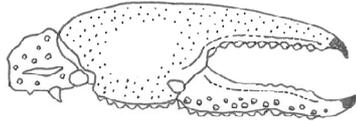
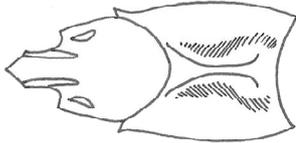
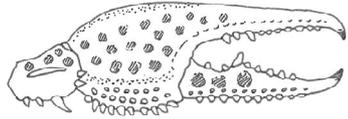
Chelae: broad and flat, dark olive green on top, with two rows of yellow-cream coloured tubercles along margins of fixed finger and one on moveable finger (also characterised by a straight margin). Upper side same colour as body, ventral side with lighter colour. Lost claws can regenerate in a smaller size. Prominent spur on inner side of carpus.

Pleopod with two long terminal projections that gently bend down and diverge from each other.

Signs of presence

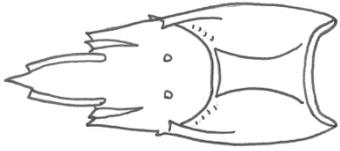
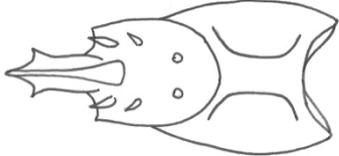
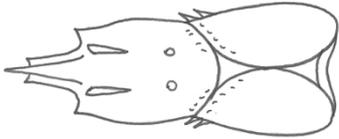
Burrows in banks of water bodies (not diagnostic). Parts of dead animals including claws and body shell can be found near their habitats or discarded by predators, e.g. in bird or mammal nests. However, identification depends on overall quality of body remains

Similar species

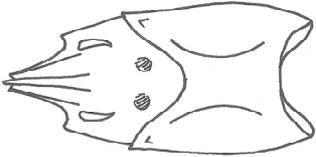
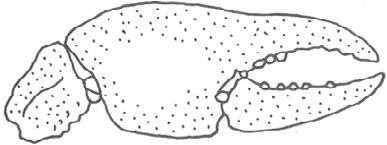
	Carapace	Chelae
<i>Orconectes limosus</i>	 <p>Rostrum without median carina. Parallel margins. Spines on each side of the carapace. Open areola.</p>	 <p>Broad and flat, with straight margin on movable finger. Rows of tubercles.</p>
<i>Orconectes rusticus</i> ⁶	 <p>Rostrum without median carina. Open areola. Dark, rusty spots on either side of its carapace.</p>	 <p>Dark rusty spots. Tubercles not in rows. Oval gap when closed.</p>
<i>Orconectes immunis</i>	 <p>No hepatic spines on lateral margins of carapace. Typical pale bands running along dorsal surface of abdomen.</p>	 <p>Broad, flattened tuberculate chela, with straight margin of movable finger.</p>

⁶ Some risk of confusion may exist with *Orconectes juvenilis*, a species phenotypically similar to *Orconectes rusticus* (see this species description) recently found in France. In fact, in France, *O. juvenilis* was initially misidentified with *O. rusticus* and only the gonopod and genetic analyses led to the correct identification. Thus, in case of doubts, an expert is needed to confirm the identification.

Other species alien to Europe

	Carapace	Chelae
<i>Procambarus fallax</i> <i>f. virginalis</i>	 Open areola.	 Very small, weakly granulate.
<i>Pacifastacus leniusculus</i>	 Rostrum with median carina. Large areola.	 Robust and smooth, with white turquoise patch on top of junction of fingers.
<i>Procambarus clarkii</i>	 No areola.	 S-shaped, covered with small bumps.

Species native to Europe

	Carapace	Chelae
<i>Austropotamobius pallipes</i>	 Rostrum with median carina. One pair of subapical spines on each side of carapace. Margins converging toward acumen. Open areola.	 Robust, weakly granulate. Pink/ beige/or white underside.

Common names

BG	-
HR	Virilni rak
CS	Rak americký
DA	Viril krebs
NL	Geknobbelde Amerikaanse rivierkreeft
EN	Virile crayfish
ET	Eesti keelse nimeta vähk
FI	Viriilirapu
FR	Écrevisse à pinces bleues
DE	Viril-Flusskrebs
EL	-
HU	Északi cifrarák

GA	-
IT	Gambero virile
LV	-
LT	Šiurkštusis vėžys
MT	-
PL	Rak prężny
PT	Lagostim-viril
RO	-
SK	Rak severný
SL	Bradavičasti trnavec
ES	Cangrejo del norte
SV	Gulvårtskräfta

Key references

Pockl M; Holdich D; Pennerstorder J, 2006. Identifying native and alien crayfish species in Europe. Melk, Austria: European Project CRAYNET, Guglar Cross Media, 47.

Souty-Grosset C, Holdich D, Noël O, Reynolds J, Haffner P (eds), 2006. Atlas of crayfish in Europe. Museum national d'Histoire naturelle, Paris

Pacifastacus leniusculus

American signal crayfish

Synonyms

None

Species ID

Kingdom: Metazoa

Division: Arthropoda

Class: Malacostraca

Order: Decapoda

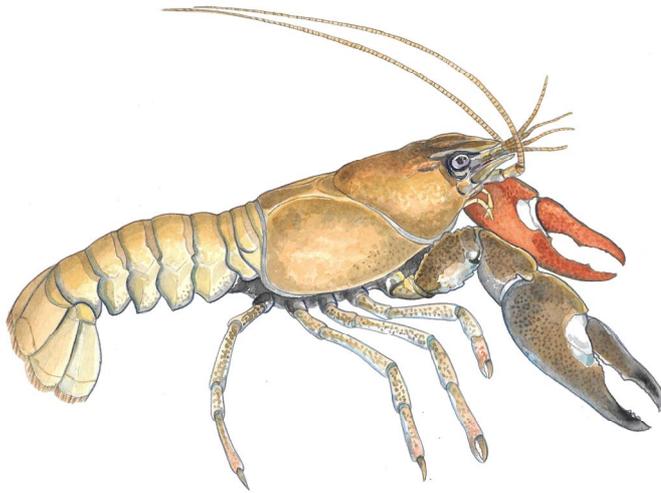
Family: Cambaridae

Genus: *Pacifastacus*

Species: *Pacifastacus leniusculus*

General description:

A relatively large crayfish, light reddish or bluish-brown in colour, from which it derives its English common name, by the presence of a white turquoise dorsal patch at the junction of the moveable and fixed finger of the chela. Can be found in a range of freshwater environments (e.g. streams, rivers, canals, ponds and lakes), and is known to dig tunnels into banks or under rocks in Europe.



Size: Total body length up to 16 cm or more (males are larger than females whose body length is usually up to 12 cm)

Disclaimer: Species identification may be difficult for non-experts and laypeople, hence it is usually recommended to contact an expert. In general, for correct identification, the animals need to be captured because the distinctive characteristics are not always visible from a distance and may be not well developed (particularly in juveniles). In some cases, identification may require specific checks, e.g. spines or male gonopod morphology (which can require the use of microscope).

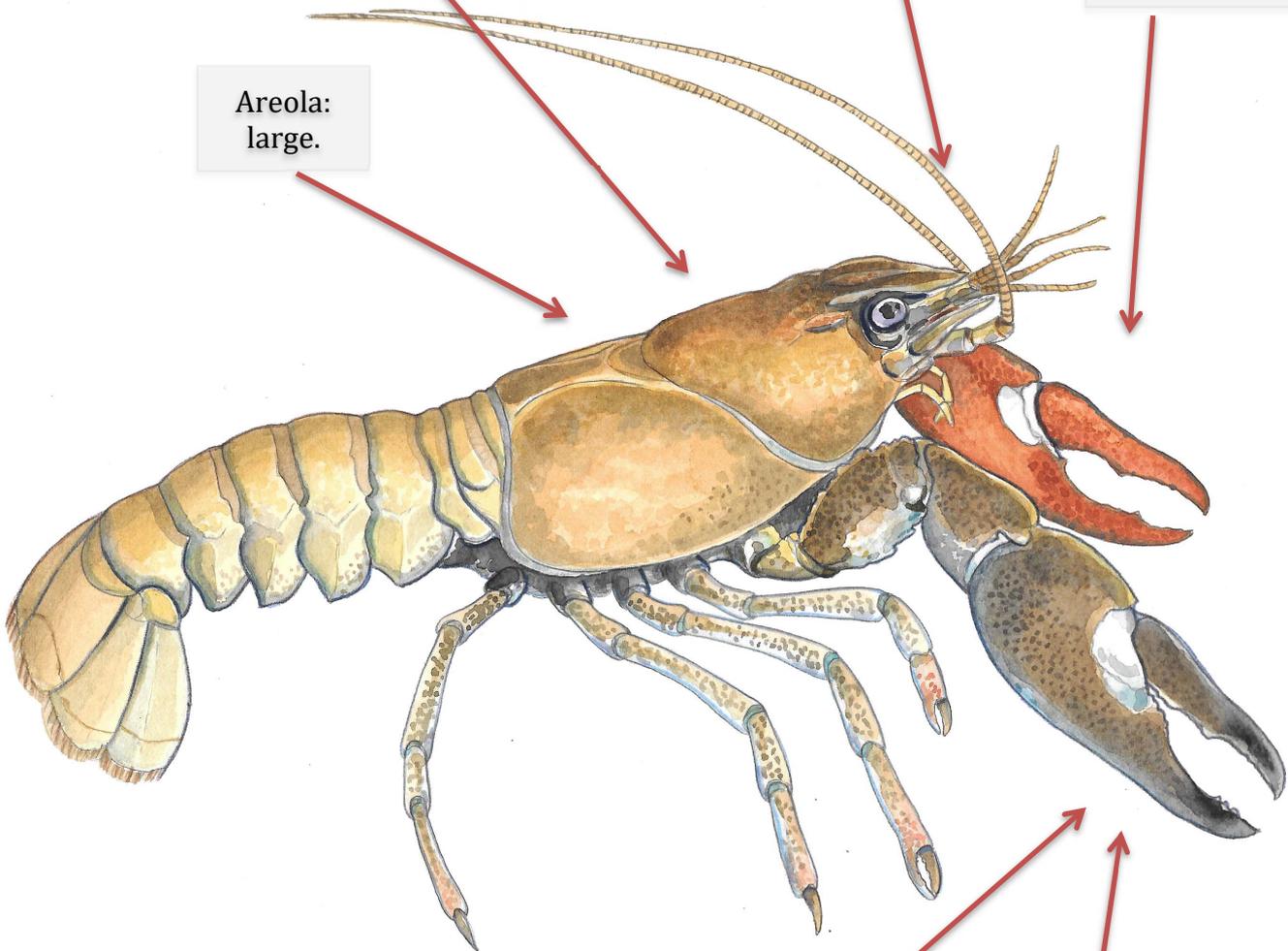
Distinctive characteristics

Carapace: smooth, light reddish-brown or bluish-brown in colouration. Two post-orbital ridges on each side, of which the anterior one with apical spine, and the posterior one not particularly developed. No spines behind cervical groove.

Rostrum: smooth parallel edges, and very pointed acumen with prominent spiniform shoulders and a simple median carina.

Chelae: bright red undersides.

Areola: large.



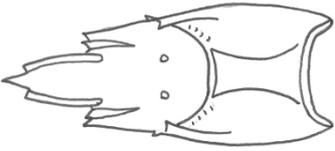
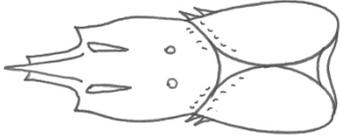
Chelae: smooth and large compared to body size (particularly in males), with widely-spaced tubercles (with shallow incision between them) on inner side of fixed finger.

Chelae: small white turquoise/white patch on the upper side at the junction of moveable and fixed finger.

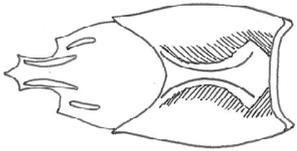
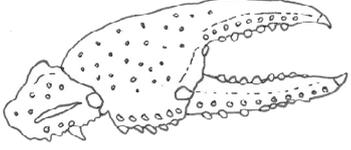
Signs of presence

Burrows in banks of water bodies (not diagnostic). Parts of dead animals including claws and body shell can be found near their habitats or discarded by predators, e.g. in bird or mammal nests. However, identification depends on overall quality of body remains.

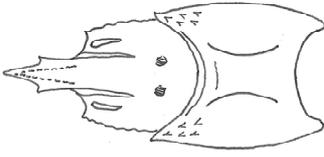
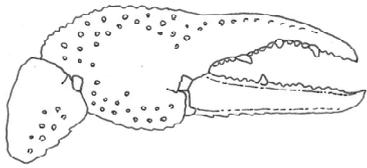
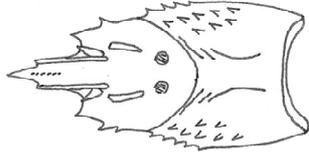
Similar species

	Carapace	Chelae
<i>Procambarus fallax</i> <i>f. virginalis</i>	 Open areola.	 Very small, weakly granulate.
<i>Procambarus clarkii</i>	 No areola.	 S-shaped, covered with small bumps.

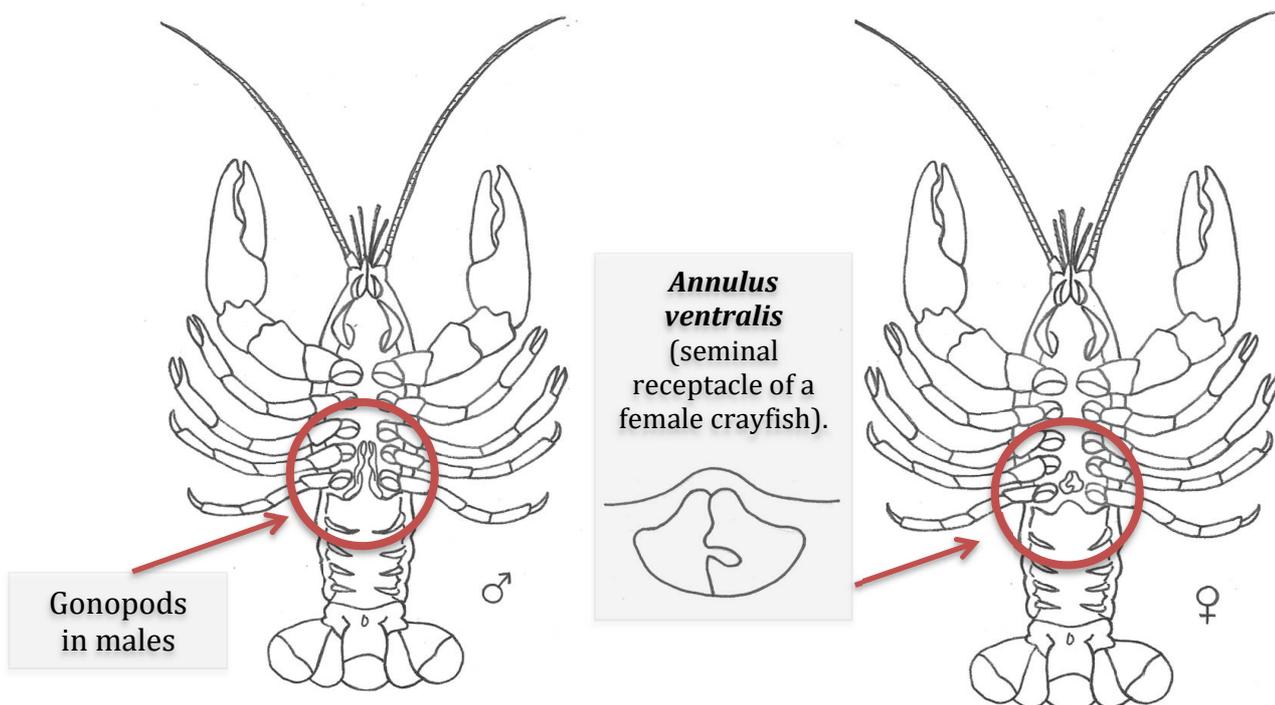
Other species alien to Europe

	Carapace	Chelae
<i>Orconectes virilis</i>	 Rostrum without median carina. Parallel margins. Open areola.	 Broad and flat, with straight margin on movable finger. Rows of tubercles. May be blue in colour.
<i>Orconectes limosus</i>	 Rostrum without median carina. Parallel margins. Spines on each side of the carapace. Open areola.	 Broad and flat, with straight margin on movable finger. Rows of tubercles.

Species native to Europe

	Carapace	Chelae
<i>Astacus astacus</i>	 <p>Rostrum with median carina. Margins almost parallel between the eyes. One pair of subapical spines on each side of the carapace. Open areola.</p>	 <p>Red undersides.</p>
<i>Astacus leptodactylus</i>	 <p>Rostrum with median carina. Parallel. Margins parallel between the eyes. One pair of subapical spines on each side of the carapace. Open areola.</p>	 <p>Uniquely shaped claws with elongated fingers.</p>

Pacifastacus leniusculus has external fecundation, and females lack the annulus ventralis (seminal receptacle), which in cambarid crayfish (*Procambarus* and *Orconectes*), is located between the 4th and 5th pairs of walking legs



Common names

BG	Американски сигнален рак
HR	Signalni rak
CS	Rak signální
DA	Signalkrebs
NL	Californische rivierkreeft
EN	Signal crayfish
ET	Signaalvähk
FI	Täplärapu
FR	Écrevisse signal
DE	Signalkrebs
EL	Αμερικανική караβίδα
HU	Jelzórák

GA	-
IT	Gambero segnalatore
LV	Amerikas signālvēzis
LT	Žymėtasis vėžys
MT	-
PL	Rak sygnałowy
PT	Lagostim-sinal
RO	Racul de California
SK	Rak signálny
SL	Signalni rak
ES	Cangrejo señal
SV	Signalkräfta

Key references

Johnsen SI, Taugbøl T, 2010. *Pacifastacus leniusculus*. NOBANIS Invasive Alien Species Fact Sheet. Online Database of the North European and Baltic Network on Invasive Alien Species - NOBANIS. <http://www.nobanis.org>

Pockl M; Holdich D; Pennerstorder J, 2006. Identifying native and alien crayfish species in Europe. Melk, Austria: European Project CRAYNET, Guglar Cross Media, 47.

Souty-Grosset C, Holdich D, Noël O, Reynolds J, Haffner P (eds), 2006. Atlas of crayfish in Europe. Museum National d'Histoire Naturelle, Paris

Procambarus clarkii

Red swamp crayfish

Synonyms

Procambarus clarki, *Scapulicambarus clarkii*

Species ID

Kingdom: Metazoa

Division: Arthropoda

Class: Malacostraca

Order: Decapoda

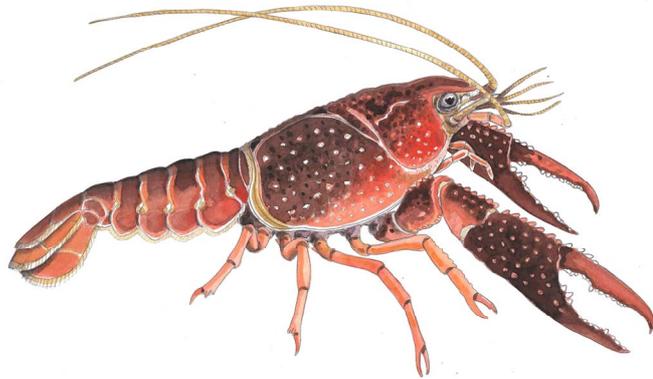
Family: Cambaridae

Genus: *Procambarus*

Species: *Procambarus clarkii*

General description:

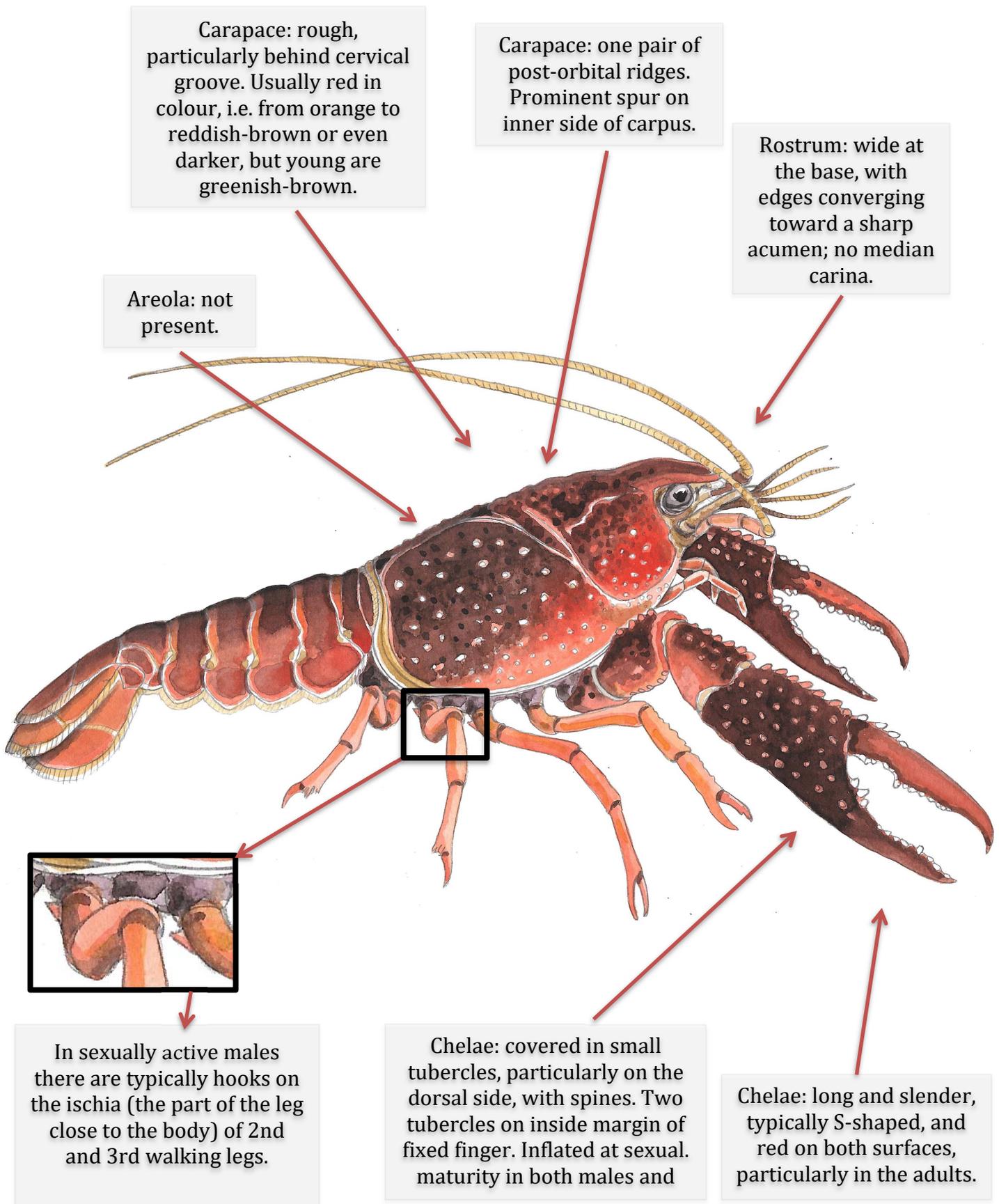
A relatively large crayfish, which can be found in a range of freshwater environments, including temporary and saline waters which the species can tolerate pretty well. Can cover large distances, even overland, and can dig tunnels into banks. As suggested by the English common name, it is usually characterised by a bright red colouration (which may vary depending on the habitat, e.g. lighter in muddy waters and darker in clear waters). The colour of young, i.e. before sexual maturity, is usually greenish-brown. Other typical features are the lack of the areola and the S-shaped chelae.



Size: Total body length up to 15 cm, usually 10 cm

Disclaimer: Species identification may be difficult for non-experts and laypeople, hence it is usually recommended to contact an expert. In general, for correct identification, the animals need to be captured because the distinctive characteristics are not always visible from a distance and may be not well developed (particularly in juveniles). In some cases, identification may require specific checks, e.g. spines or male gonopod morphology (which can require the use of microscope).

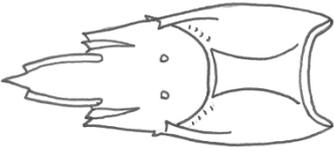
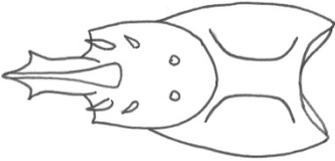
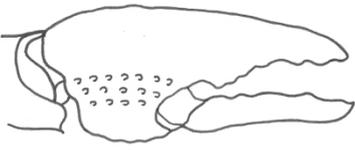
Distinctive characteristics



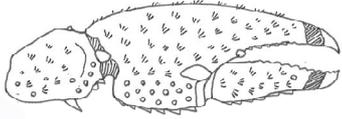
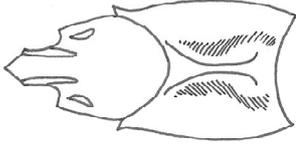
Signs of presence

Burrows in banks of water bodies (not diagnostic). Parts of dead animals including claws and body shell can be found near their habitats or discarded by predators, e.g. in bird or mammal nests. However, identification depends on overall quality of body remains.

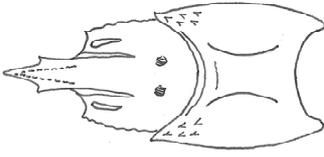
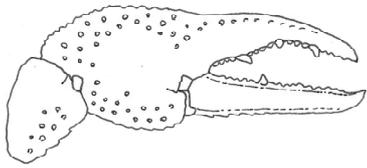
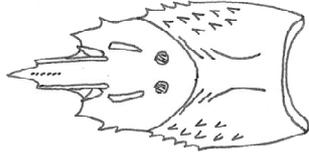
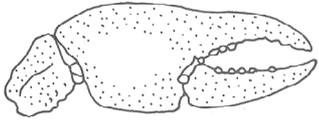
Similar species

	Carapace	Chelae
<i>Procambarus fallax</i> <i>f. virginalis</i>	 Open areola.	 Very small, weakly granulate.
<i>Pacifastacus leniusculus</i>	 Rostrum with median carina. Large areola.	 Robust and smooth, with white turquoise patch on top of junction of fingers.

Other species alien to Europe

	Carapace	Chelae
<i>Orconectes limosus</i>	 Rostrum without median carina. Parallel margins. Spines on each side of the carapace. Open areola.	 Broad and flat, with straight margin on movable finger. Rows of tubercles.
<i>Orconectes immunis</i>	 No hepatic spines on lateral margins of carapace. Typical pale bands running along dorsal surface of abdomen.	 Broad, flattened tuberculate chela, with straight margin of movable finger.

Species native to Europe

	Carapace	Chelae
<i>Astacus astacus</i>	 <p>Rostrum with median carina. Margins almost parallel between the eyes. One pair of subapical spines on each side of the carapace. Open areola.</p>	 <p>Red undersides.</p>
<i>Astacus leptodactylus</i>	 <p>Rostrum with median carina. Parallel. Margins parallel between the eyes. One pair of subapical spines on each side of the carapace. Open areola.</p>	 <p>Uniquely shaped claws with elongated fingers.</p>
<i>Austropotamobius pallipes</i>	 <p>Rostrum with median carina. One pair of subapical spines on each side of carapace. Margins converging toward acumen. Open areola.</p>	 <p>Robust, weakly granulate. Pink/ beige/or white underside.</p>

Common names

BG	-
HR	Crveni močvarni rak
CS	Rak červený
DA	Louisiana-flodkrebs
NL	<u>Rode Amerikaanse rivierkreeft</u>
EN	Red Swamp Crayfish
ET	Punane soovähk
FI	Punarapu
FR	Écrevisse rouge des marais
DE	Roter Amerikanischer Sumpfkrebs
EL	βαλτογαρίδες
HU	Kaliforniai vörösrák

GA	-
IT	Gambero rosso americano
LV	Sarkanais purva vēzis
LT	Klarko vėžys
MT	Gamblu tal-Ilma Helu
PL	Rak luizjański
PT	Lagostim-vermelho-da-Louisiana
RO	Racul de Louisiana
SK	Rak červený
SL	Močvirski škarjar
ES	Cangrejo rojo
SV	Röd sumpkräfta

Key references

Pockl M; Holdich D; Pennerstorder J, 2006. Identifying native and alien crayfish species in Europe. Melk, Austria: European Project CRAYNET, Guglar Cross Media, 47.

Souty-Grosset C, Holdich D, Noël O, Reynolds J, Haffner P (eds), 2006. Atlas of crayfish in Europe. Museum national d'Histoire naturelle, Paris

Procambarus fallax f. *virginalis*

Marmorkrebs, marbled crayfish

Synonyms

Procambarus sp.

Species ID

Kingdom: Metazoa

Phylum: Arthropoda

Class: Malacostraca

Order: Decapoda

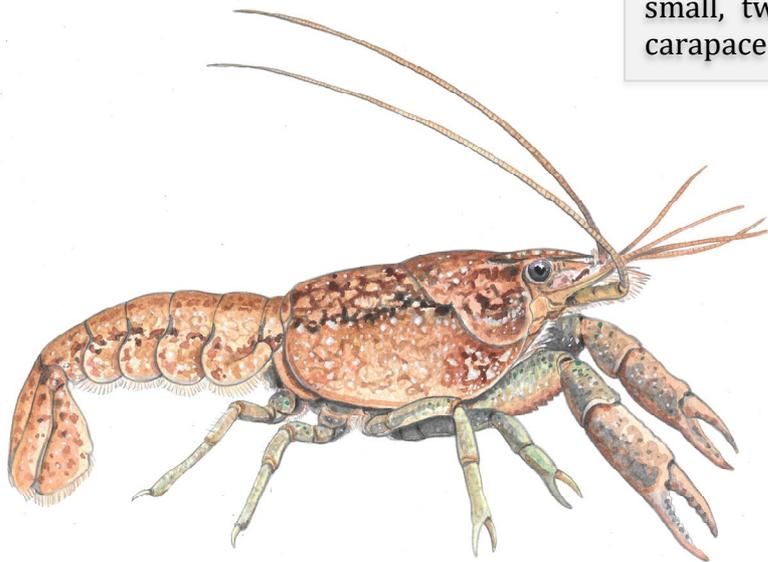
Family: Cambaridae

Genus: *Procambarus*

Species: *Procambarus fallax* f. *virginalis*

General description:

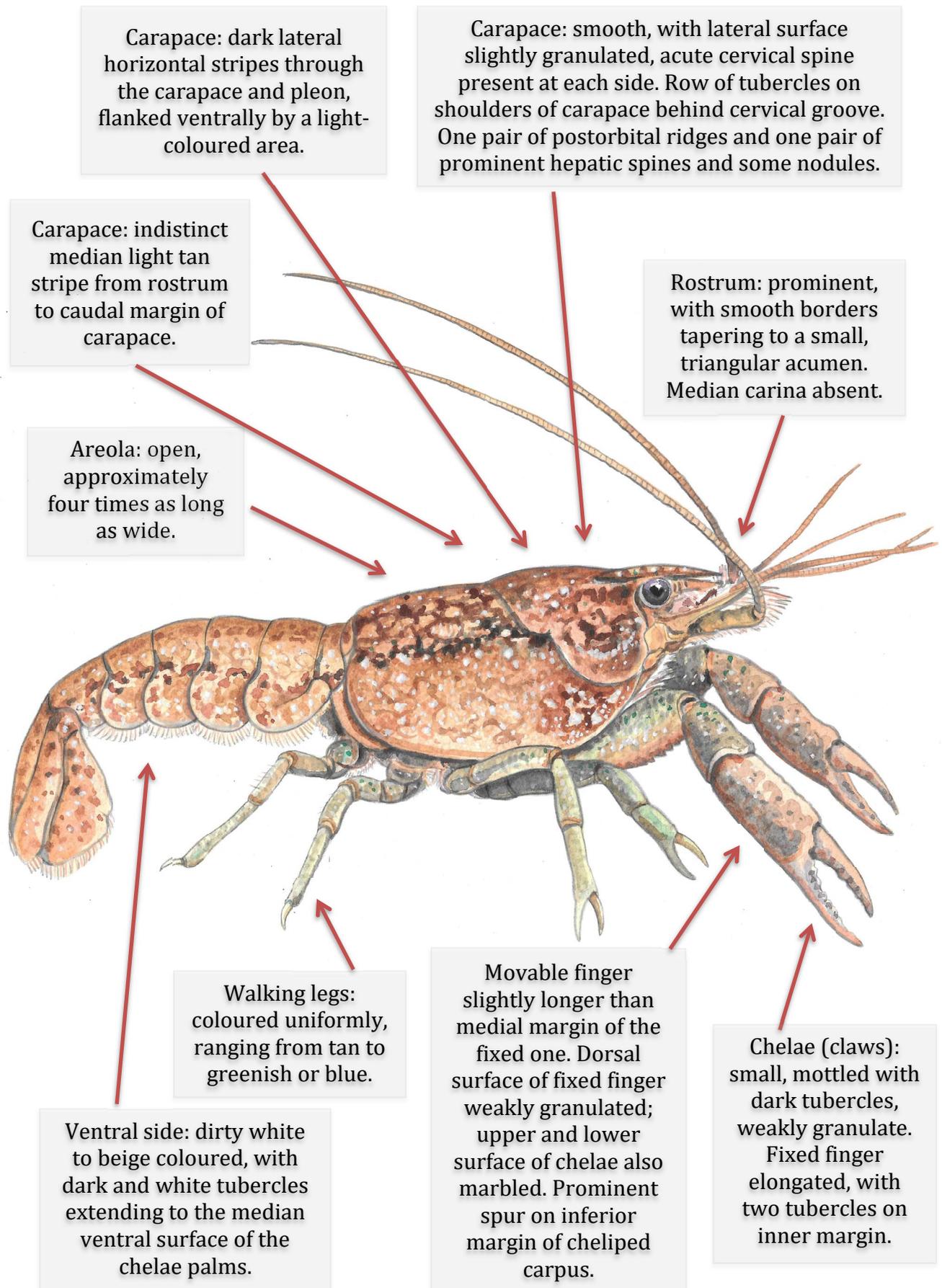
The marble pattern, from which the common name Marmorkrebs is derived (German for “marbled crayfish”), is always present and especially prominent on the lateral parts of the carapace. The marble pattern is highly variable, usually dark brown to olive, but can vary from tan to reddish brown or blue. Chelipeds (claws) are relatively small, two times shorter than the carapace length.



Size: Up to 13 cm, but often less than 10 cm

Disclaimer: The taxonomic identity of this species - recently recognized as new independent species (Lyko F. 2017) - was uncertain. As shown by molecular techniques and morphological studies, it seemed to be the parthenogenetic form of *Procambarus fallax* (all marbled crayfish known so far are female and all specimens in Europe are clones). Individuals confirmed as marmorkrebs by molecular techniques, but with rather different body patterns and a totally different rostrum shape, are known. Species identification of juveniles is even more difficult for non-experts because the distinctive characteristics are not always well developed. It can require the use of microscope. Just in case, it is recommended to contact an expert.

Distinctive characteristics

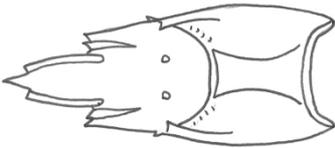
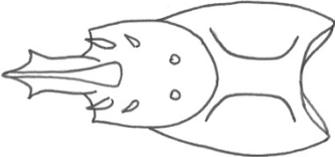
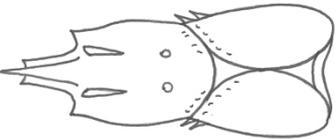


Signs of presence

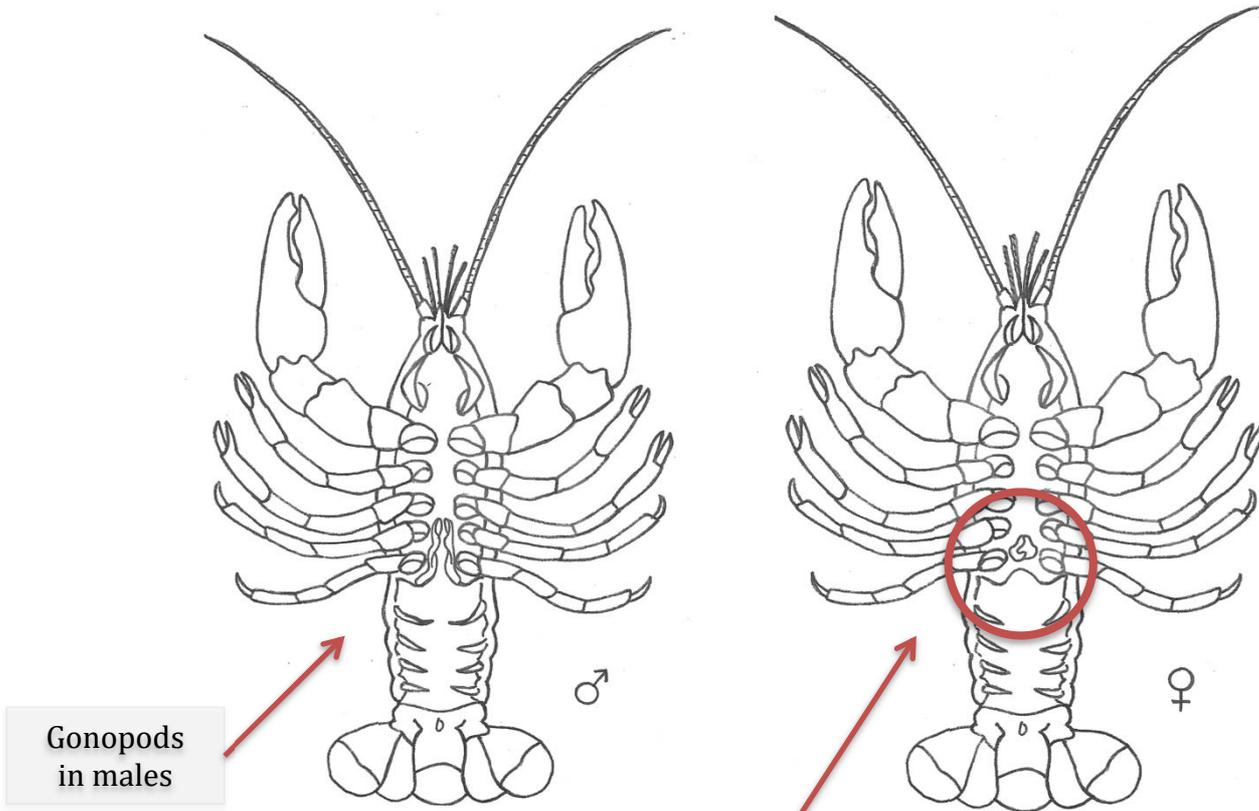
Burrows in banks of water bodies (not diagnostic). Parts of dead animals including claws and body shell can be found near their habitats or discarded by predators, e.g. in bird or mammal nests. However, identification depends on overall quality of body remains.

Similar species

About 460 species of cambarids are known, of which around 179 species belonging to the genus *Procambarus*, although not all are found in trade. A high degree of overlap exists between species. Additionally, *Procambarus fallax f. virginialis* is characterised by a high intraspecific variability, e.g. concerning colouration, growth, life-span, reproduction, behaviour and number of sense organs, due to non-genetic or environmentally induced changes during ontogenesis. For example, differences may occur in the marbled pattern, the rostrum shape, and the presence of several spines at the margin of the rostrum. In particular, the rostrum variations led to uncertainties because shape and other features of this body part are important characters for species identification within cambarids (Martin et al. 2010).

	Carapace	Chelae
<i>Procambarus fallax f. virginialis</i>	 Open areola.	 Very small, weakly granulate.
<i>Pacifastacus leniusculus</i>	 Rostrum with median carina. Large areola.	 Robust and smooth, with white turquoise patch on top of junction of fingers.
<i>Procambarus clarkii</i>	 No areola.	 S-shaped, covered with small bumps.
<i>Procambarus fallax</i>	<i>Procambarus acutus</i> and <i>Procambarus zonangulus</i>	<i>Procambarus alleni</i>
Very similar to <i>Procambarus fallax f. virginialis</i> . Marble pattern less evident.	Very similar to <i>P. clarkii</i> , their taxonomy is still debated, possibly may belong to a species complex. Carapace covered in tubercles producing a rough texture. Open areola. Chelae long and slender.	Very similar to <i>P. clarkii</i> , but usually bluish tinged to brightly blue coloured (which may occur also to marmorkreb in water with low pH). Marble pattern less evident. Characteristic facial dark spots. Chelae: marble pattern less evident, not as slender, tickier.

Procambarus fallax f. virginalis is a species that reproduces parthenogenetically, and only females are known⁷. Therefore, a way to exclude that the crayfish to be identified belongs to *Procambarus fallax f. virginalis* is to check the presence of gonopods⁸, which occur only in male crayfish (left).



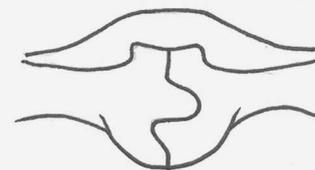
Gonopods
in males

Annulus ventralis
(seminal receptacle of
a female crayfish).

It is located on the
ventral side between
the bases of the 4th
and 5th walking legs,
and becomes cornified
in mature females.



***Procambarus fallax f.
virginalis***



Procambarus clarkii

⁷ With the notable exception of an intersexual specimen (with both *Annulus ventralis* and only one pair of gonopods) found in 2010 in a lab (Martin & Scholtz 2012).

⁸ The gonopods are the first two pairs of pleopods (also known as swimmerets) on the crayfish's abdomen. The gonopods have been specially modified for reproductive purposes. The gonopods are held against the body of the crayfish between the last two pair of walking legs.

Common names

BG	-
HR	Mramorni rak
CS	rak mramorovaný
DA	Marmorkrebs
NL	Marmerkreeft
EN	Marbled crayfish (Deceitful Crayfish)
ET	marmorvähk
FI	Marmorirapu (supi)
FR	Écrevisse marbrée
DE	Marmorkrebs
EL	-
HU	virginiai márványrák

GA	-
IT	Gambero marmorato
LV	marmorvēzis
LT	marmurinis vėžys
MT	-
PL	rak marmukowy
PT	Lagostim-mármore
RO	Rac marmorat
SK	rak mramorový
SL	marmornati škarjar
ES	cangrejo originario de América
SV	marmorkräfta

Key references

CABI, 2017. *Procambarus fallax* f. *virginalis* (Marmorkrebs) [original text by Christoph Chucholl]. In: Invasive Species Compendium. Wallingford, UK: CAB International. <https://www.cabi.org/isc/datasheet/110477> (Access Date: 01/11/2017)

Holdich D, 2011. GB Non-native Organism Risk Assessment for *Procambarus* sp. www.nonnativespecies.org (Access Date: 01/11/2017)

Lyko F, 2017. The marbled crayfish (Decapoda: Cambaridae) represents an independent new species. *Zootaxa* 4363(4): 544-552.

Martin P, Scholtz G, 2012. A case of intersexuality in the parthenogenetic Marmorkrebs (Decapoda: Astacida: Cambaridae). *Journal of Crustacean Biology* 32: 345–350.

Martin P, Shen H, Füllner G, Scholtz G, 2010. The first record of the parthenogenetic Marmorkrebs (Decapoda, Astacida, Cambaridae) in the wild in Saxony (Germany) raises the question of its actual threat to European freshwater ecosystems. *Aquatic Invasions* 5:397-403.

Pöckl M, Holdich DM, Pennerstorfer J, 2006. Identifying native and alien crayfish species in Europe. European Project CRAYNET.

Souty-Grosset C, Holdich DM, Noël PY, Reynolds JD, Haffner P, (eds), 2006. *Atlas of Crayfish in Europe*. Muséum National d'Histoire Naturelle, Paris. Patrimoines naturels, 64.