

The colour pattern of *Idunella picta* (Norman, 1889) is interpreted as mimetism with dark plant debris (Crustacea, Amphipoda, Liljeborgiidae)

Cédric d'Udekem d'Acoz

On March 22th 2015, during the field trip of the naturalist field club “Strandwerkgroep” to northern Brittany (France), crustaceans and other invertebrates were collected at extreme low tide in the Bay of Morlaix, on the eastern side of Ile Callot (48°41.4'N 03°55.2'W). Biological material was extracted from 10–15 kg of muddy gravel mixed with maerl, gathered close to beds of *Zostera marina*. The sediment was first sieved through two circular plastic sieves (mesh size 2 and 1 mm), in order to remove the coarsest (shells, gravel, maerl) and the finest (mud and silt) fractions. The medium (mostly sand) fraction was then put in a bucket filled with seawater. The whole was swirled into motion by hand, and the light elements (small organisms and fine plant remains) were separated from the sand by filtering the water on the 1 mm sieve. The procedure was repeated several times in order to extract as much material as possible. The sand was finally abandoned on the shore. In the lab, the light fraction was examined under a dissecting microscope and a few photographs were taken with an Olympus TG3 camera. The sample was then fixed in alcohol. It was sorted out later and is now deposited in the collections of the Royal Belgian Institute of Natural Sciences.

The light elements consisted of a considerable volume of black and dark brown vegetal debris (mostly dead remains of *Zostera marina*, e.g. seeds and fragments of leaves, rhizomes and roots) mixed with small invertebrates (mostly amphipod crustaceans). The most abundant amphipod was *Gammarella fucicola* (Leach, 1814). This is a common intertidal and coastal species, which has been recorded from a wide range of biotopes (Toulmond & Truchot 1964), so its abundance in the material is no surprise. The second most common species was *Idunella picta* (Norman, 1889) (= *Listriella picta* (Norman, 1889)), of which more than 30 specimens were collected. The local abundance of *Idunella picta* on the eastern side of Ile Callot, which was already reported by d'Udekem d'Acoz (2010), is intriguing. Indeed, while the species cannot be considered as extremely rare in France (Chevreux & Fage 1925), it is definitely uncommon, with a patchy distribution (Toulmond & Truchot 1964).

The colour pattern of *Idunella picta* is unique among European amphipods. The anterior half of its body (including coxae and gnathopods) is uniformly blackish brown, the posterior half being whitish with a few much smaller blackish brown marks (Fig. 1) (see

also Myers & McGrath 1983). This colour pattern is very constant. Norman (1889), who published the original description of the species (as *Lilljeborgia picta*), considered its colouration so remarkable, that he named it '*picta*', meaning painted.

When sorting the newly collected specimens, a striking similarity between the size, shape and colour of the dark parts of *Idunella picta* and the particles of *Zostera* debris became immediately apparent. This was documented by photographs, of which two are published herein (Fig. 2). It seems unlikely that this morpho-chromatic similarity is a mere coincidence. The colour pattern of *I. picta* is interpreted herein as a probable form of mimetism with fine dark plant remains associated with a background of light-coloured mineral particles. The very different colouration of the anterior and posterior parts of *I. picta* also breaks up the animal's outline, so that the colour pattern of this amphipod can be considered as disruptive. For potential predators like small fish, it would presumably be difficult to see the difference between abundant blackish plant remains laying on or swirling just above a bed of light-coloured sand or gravel, and the much less abundant *I. picta* specimens of similar appearance and colouration. The abundance of fine blackish plant remains on the east side of Ile Callot is therefore interpreted as a key factor explaining the local abundance of *I. picta*. The local abundance of fine particles of dead seagrass can itself be explained by the local abundance of beds of *Zostera marina* L. and the sheltered nature of the environment (the Bay of Morlaix), which limits the long-distance dispersal and removal of the accumulated dead remains of *Zostera*. Instead of being transported far away by wave action, they locally aggregate on the coarse substrate and/or mix with its loose matrix without being deeply buried. The abundance of gravel mixed with maerl is probably another favourable environmental factor. For example, Chevreux (1900) and Toulmond & Truchot (1964) already noted the association between *Idunella picta* and maerl beds, although Chevreux & Fage (1925) recorded it on gravel, suggest a broader preference for coarse sediments.

Samenvatting

Op 22 maart 2015, tijdens de meerdaagse excursie van de Strandwerkgroep naar het noorden van Bretagne, werden in de Baie de Morlaix, aan de oostkant van het Ile Callot (48°41.4'N 03°55.2'W), een aantal vlokreeften gezeefd uit een sediment van slibrijk grint met maerl, dicht bij een vegetatie van groot zeegras, *Zostera marina*. Het materiaal werd achteraf behandeld en is opgenomen in de collecties van het Koninklijk Belgisch Instituut voor Natuurwetenschappen. Het bevatte ook zeer veel donker debris van dood zeegras. De algemeenste soort was *Gammarella fucicola* (Leach, 1814), maar er werd ook veel *Idunella picta* (Norman, 1889) (= *Listriella picta* (Norman, 1889)) gevonden. Dit is een niet zo algemene soort met een verspreid voorkomen. Deze vlokreeft heeft een opvallend, constant kleurpatroon. De voorste helft van het lijf uniform bruinzwart, terwijl de achterste helft juist witachtig is enkele kleine bruinzwarte stippen.

Dit kleurpatroon wordt hier voorgesteld als een vorm van mimicry: de vlokreeften lijken zo heel sterk op het zeegrasdebris (donker) dat beweegt over de bleke minerale zeebodem. Dit breekt ook de typische bouw van het vlokreeftlijf en brengt zo mogelijke predatoren in de war. In de literatuur wordt ook een associatie met grove, gemengde grint/maerl sedimenten genoteerd. (GR)

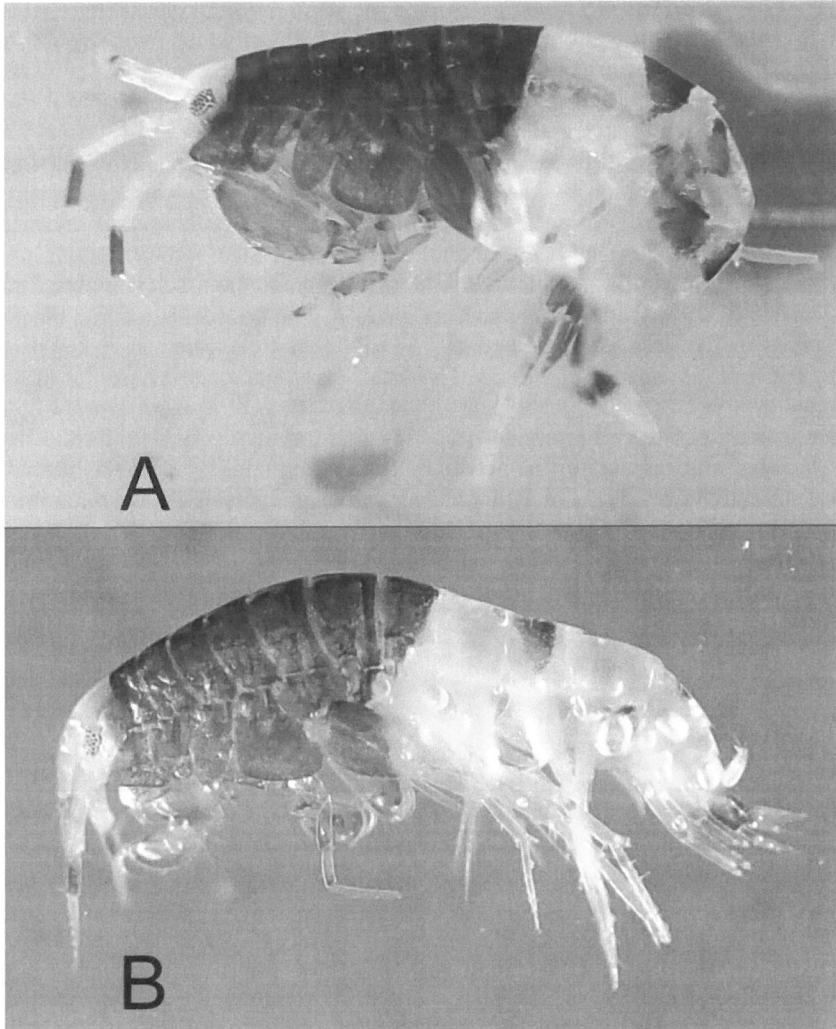


Figure 1: Colour pattern in life of *Idunella picta* (Norman, 1889).
A. Male. B. Female. The total length of the amphipods is about 6 mm.

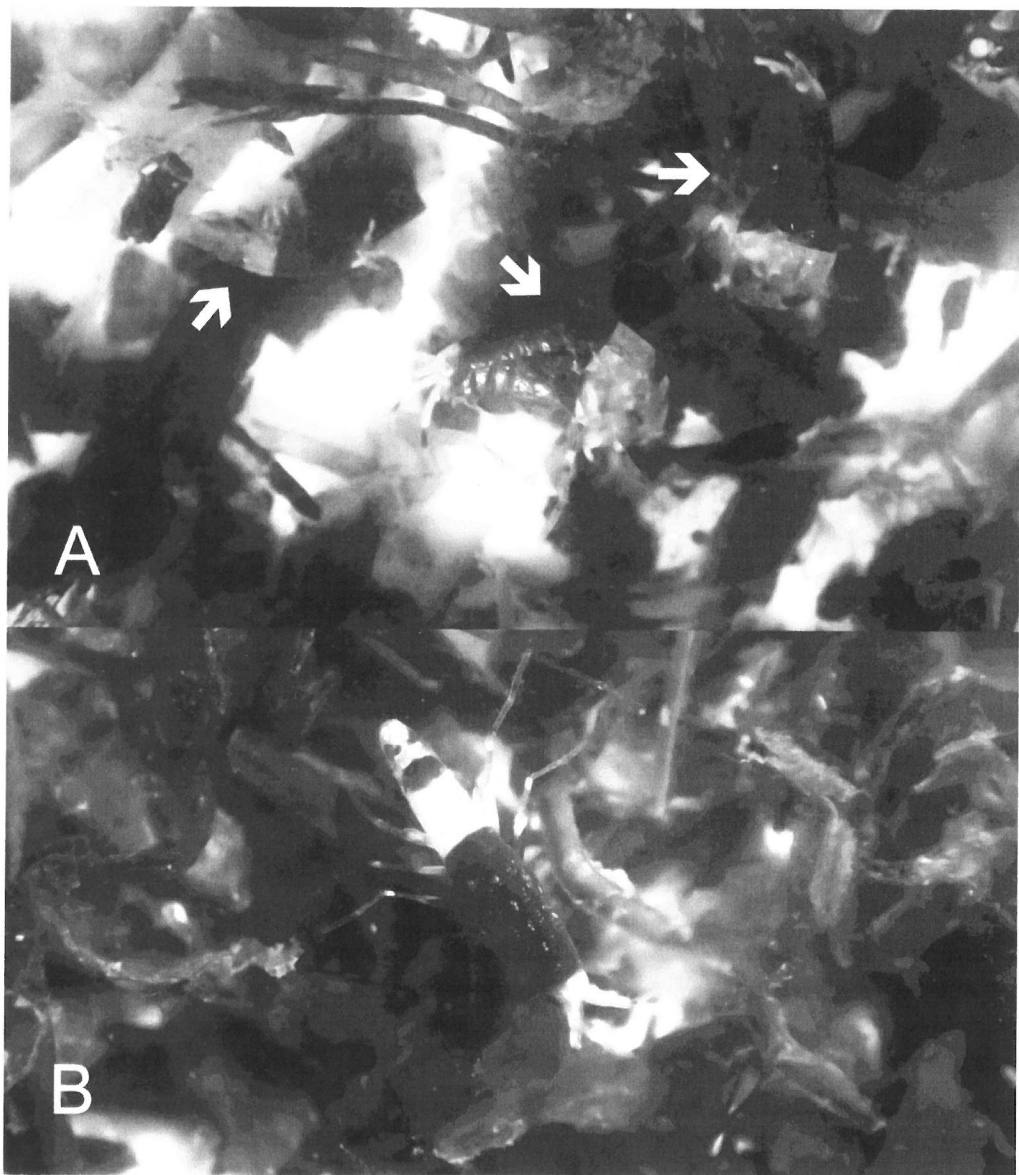


Figure 2: Living *Idunella picta* (Norman, 1889) amidst particles of dead *Zostera marina* L. collected with them. A. Specimens in sideways disposition. B. Specimen crawling and seen from above. Note the mimetism provided by their colour pattern.

References

- CHEVREUX, E., 1900. Amphipodes provenant des campagnes de l'Hirondelle (1885–1888). Résultats des Campagnes Scientifiques du Prince de Monaco, 16: i–iv + 1–195 + pls 1–18.
- CHEVREUX, E. & L. FAGE, 1925. Amphipodes. Faune de France, 9: 1–488. Paul Lechevalier, Paris.
- D'UDEKEM D'ACUZ, C., 2010. Contribution to the knowledge of European Liljeborgiidae (Crustacea, Amphipoda), with considerations on the family and its affinities. Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Biologie / Bulletin van het Koninklijk Belgisch Instituut voor Natuurwetenschappen, Biologie, 80: 127–259.
- MYERS, A.A. & D. MCGRATH, 1983. The genus *Listriella* (Crustacea: Amphipoda) in British and Irish waters, with the description of a new species. Journal of the Marine Biological Association of the United Kingdom, 63: 347–353.
- NORMAN, A.M., 1889. Note son [sic] British Amphipoda.—II. Families Leucothoidæ, Pardaliscidæ, and Gammaridæ (Marine). Annals and Magazine of Natural History, series 6, 4: 113–141 + pls 10–12.
- TOULMOND, A. & J.-P. TRUCHOT, 1964. *Inventaire de la faune marine de Roscoff. Amphipodes - Cumacés*. Travaux de la Station Biologique de Roscoff, Suppl., 42 pp.

**Royal Belgian Institute of Natural Sciences,
rue Vautier 29, B-1000 Brussels, Belgium**