Preliminary data on the impact of microplastics on blue-red shrimp (*Aristeus antennatus*) in the Mediterranean Sea

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THE PLASTIC PROBLEM

Microplastic pollution is currently one of the most concerning threats for wildlife. Ingestion of microplastics has been confirmed in a wide variety of marine species (Lusher et al., 2017). However, their potential effects remain unclear and only a few studies have addressed this issue in natural environments. The present study aims to assess the presence and potential effects of microplastics in the shrimp *Aristeus antennatus*, with a particular focus on diet.

WHAT WE DID

29 individuals were collected from three different localities in the NW Mediterranean Sea in 2011.

A	**SHRIMP CONDITION**	Body weight & length Condition indices
	Prey items identified, weighted & classified	**DIET** B
C	**MICROPLASTIC PRESENCE**	Presence / Absence

This is *Aristeus antennatus*, a commercially and ecologically key species in the Mediterranean Sea.

01 PLANKTONIC
Close to water column
e.g. Alcyopidae (Annelida)

02 HYPERBENTHOS
Just above the sediment
e.g. *Boreomysis arctica*

03 EPIBENTHOS
On top of sediments
e.g. *Abra longicallus*

04 ENDOBENTHOS
Buried under sediment
e.g. *Leucon longirostris*

Fig. 1 Ecological categories used for classification of diet items.

WHAT PLASTIC LOOKED LIKE

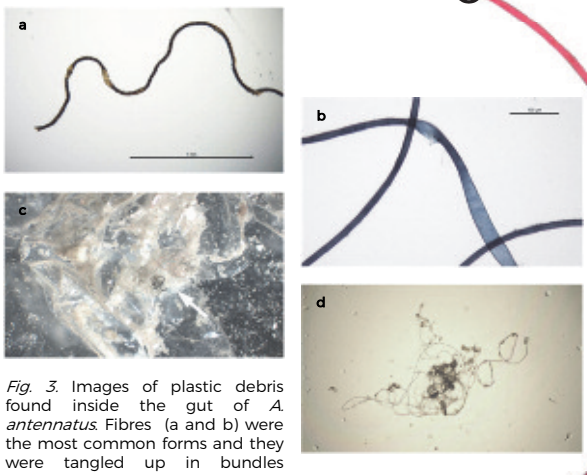


Fig. 3. Images of plastic debris found inside the gut of *A. antennatus*. Fibres (a and b) were the most common forms and they were tangled up in bundles sometimes (c and d). In (c) you can see the bundle (arrow) on a freshly opened stomach.

WHAT WE FOUND

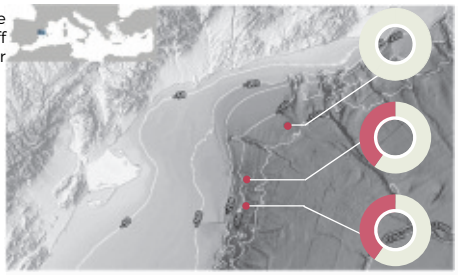


Fig. 2 Sample sites situated off the Ebro River Delta.

0%
no plastic debris was found in individuals from Cap Salou.

40%
of plastic occurrence in two out of three localities sampled

No relationship found between **MICROPLASTIC PRESENCE** and **SHRIMP CONDITION** or **STOMACH FULLNESS**

Light differences found in **DIETARY COMPOSITION** between individuals with microplastics and those without (PERMANOVA; p=0,068; all items considered without regard of their ecological category)

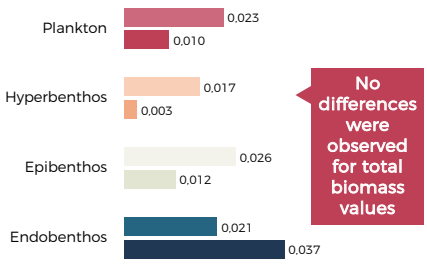
LOOKING FURTHER INTO DIETARY COMPOSITION

WITH vs **WITHOUT** MICROPLASTICS

Shrimps with microplastics showed more endobenthic prey items (p=0,02) than those without.

Contribution of endobenthos to gut content was higher in those individuals with microplastics (p=0,007).

TOTAL BIOMASS



No differences were observed for total biomass values

Fig. 4 Mean values of total biomass (g) of each ecological category for gut contents of shrimps with (top bars) and without microplastics (bottom bars).

DIVERSITY

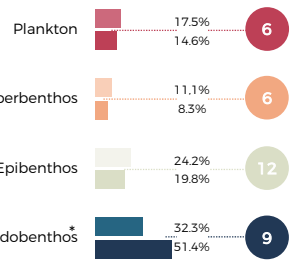


Fig. 5 Mean values of diversity (calculated as the number of items present of the total items observed overall) of each ecological category for gut contents of shrimps with (top bars) and without microplastics (bottom bars). Values inside the circles indicate maximum values observed overall.

RELATIVE BIOMASS

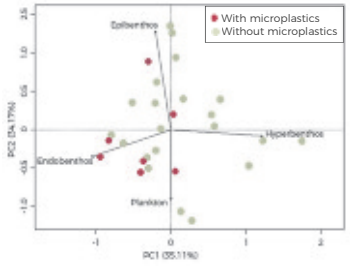


Fig. 6 PCA biplot with *A. antennatus* individuals according to relative biomasses of each ecological category. Relative biomasses were estimated as the percentage of biomass of all items of a given category in relation to total gut content.

CONCLUSIONS

WITH vs **WITHOUT**

Differences in dietary composition

There is a natural variability on the feeding habits of *A. antennatus* (Cartes et al., 2008)

Some shrimps might have preference for endobenthos

Microplastics sink and accumulate in sediments (Woodall et al., 2015)

Those shrimps preying on endobenthos ingest more microplastics

Once inside, the complex gut morphology might favour microplastic accumulation and bundle formation

REFERENCES

Cartes et al., (2008) *Progress in Oceanography* 79. 37-54.
Lusher et al., (2017) *Analytical Methods* 9, 1346-1360.
Woodall et al., (2015) *Royal Society Open Science* 1:140317.

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