



# The collection of Gustave Gilson as a reference framework for the Belgian marine fauna

*A feasibility study*



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- **The “Gilson collection”**
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  - **DNA extraction and amplification**
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  - **Sediment grain-size evaluation**
- **End products**
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# Introduction

## Why a feasibility study?



# Objectives

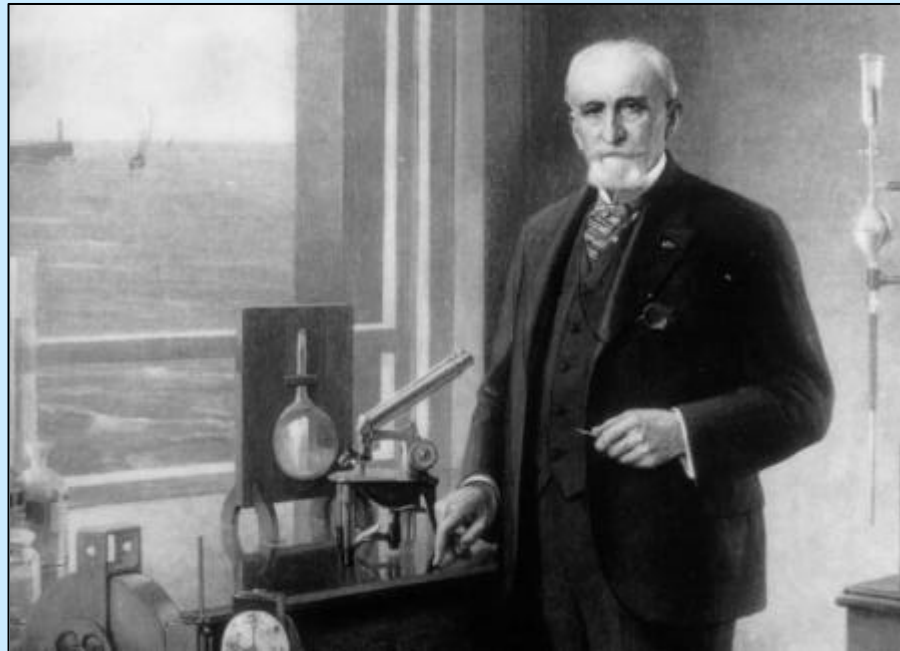
- **Inventory of the “Gilson collection”**
- **Possible applications : case studies**



# The Gilson collection

What is the “Gilson collection”?

# Gustave Gilson (1859 - 1944)



**Biologist, oceanographer**

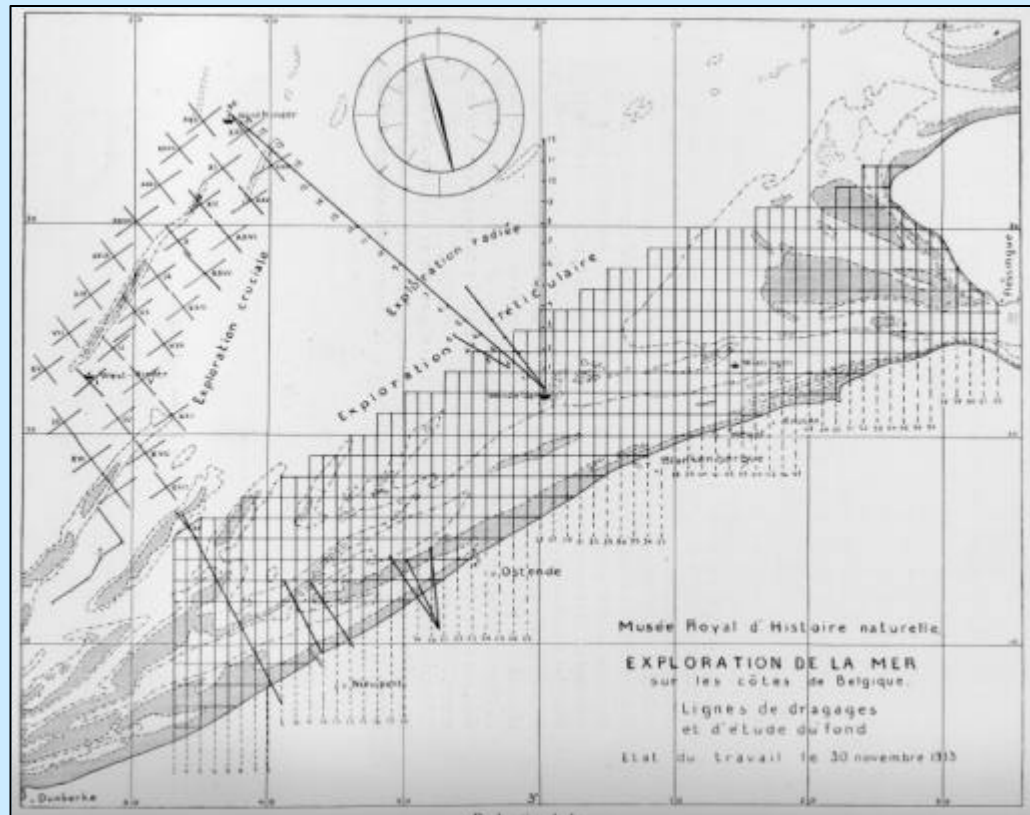
**Professor at Leuven University**

**Director of the Royal Belgian Institute of Natural Sciences**



# Surveys

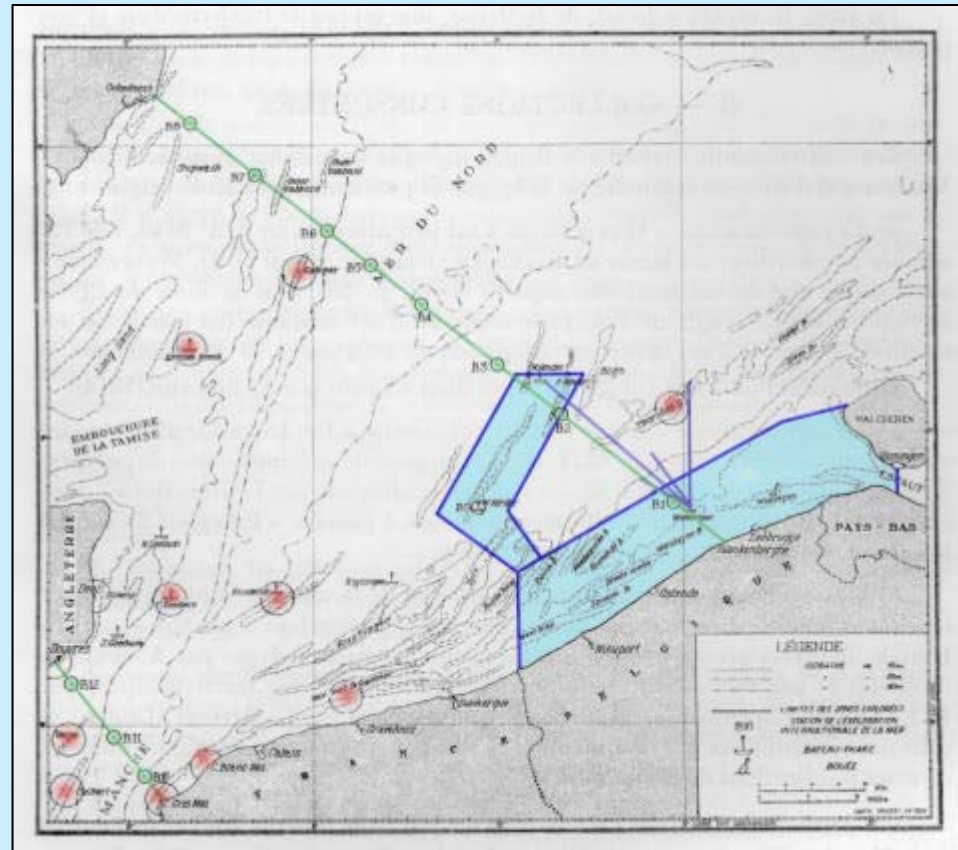
## 1. “Exploration de la Mer au voisinage des côtes de la Belgique”, 1899 - 1914



2. Scattered sampling sites in the southern North Sea



3. ICES transects : oceanographic data and plankton,  
1903 - 1914 : 44 sampling campaigns







# Sampling instruments

The “ground collector”  
(sediment and infauna)



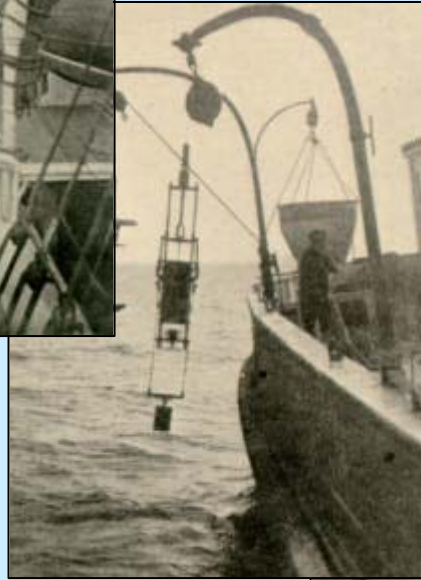
The towed dredge  
(epifauna and infauna)



**Plankton nets (Petersen, ...)**



**Water bottles (Nansen, Richard)**



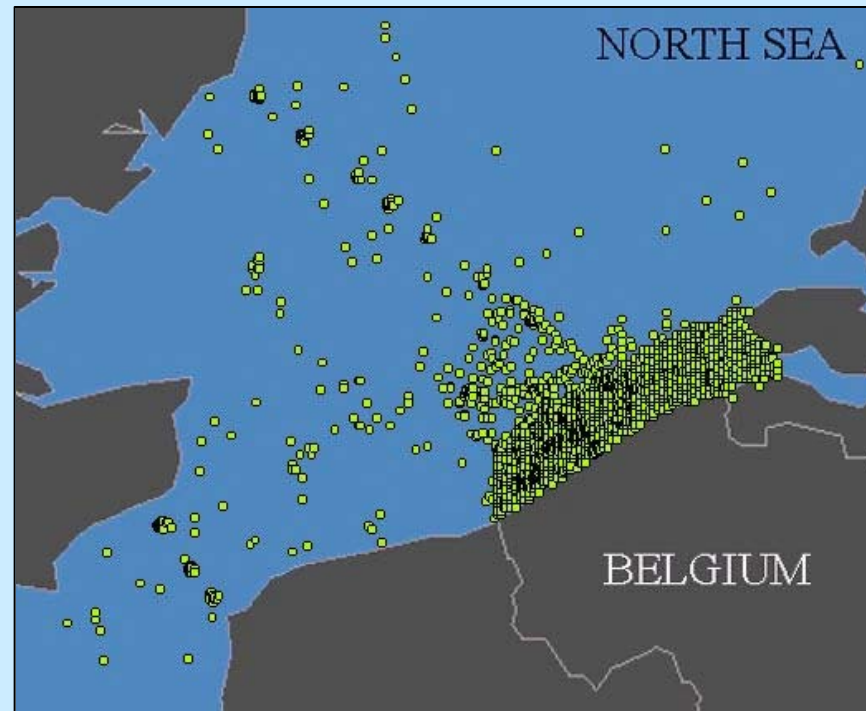
**Trawls (beam trawl, otter trawl, ...)**





## 14,000 samples collected

- 3,000 sediments samples
- 9,500 biota samples (plankton, benthos, fish)
- 1,500 water samples



# Sampling information



Observations météorologiques et océanographiques  
à faire aux stations.

Localité *24*

Date *15-11* | Navire

Mouillé à *11h11* h. Soudé *25* m.

Dérapé à h. Soudé m.

**ATMOSPHERE**

Baromètre *779*

Thermomètre à l'ombre *10.7*

Psychromètre | Thermomètre sec

| Thermomètre humide

Direction du vent *SW* Vitesse

État du ciel *cloudy*

**MER**

État de la mer *trough*

État de la marée *flot*

Direction et vitesse du courant

Transparence, tr = *2.50* m. Couleur

Température de l'eau Densité de l'eau

NIVEAU	TEMPER.	NUMÉRO
Surface	<i>11.70</i>	<i>11.7</i>
5 m.	<i>11.60</i>	<i>11.77</i>
10	<i>11.50</i>	<i>11.77</i>
15 m.	<i>11.40</i>	<i>11.77</i>
20		
25		
30 m.	<i>11.30</i>	<i>11.72</i>
35		
40 m.	<i>11.20</i>	<i>11.77</i>
50		
60		

**FOND**

Numéro de l'échantillon

Nature de l'échantillon

SÉDIMENT N° *691*

Navire *Lemercœur n°1*

Localité *6C*

Date *30 Août 1906*

Profondeur *15.00* m.

Temps *11.22*

Coexistence, en plomb *Argent*

Collecteur employé *Soubert n°1*

Caractères de l'échantillon

*Vase noir, bract de vase gris, un peu de  
sable fin blanc.*

REMARQUES

# Preserved collection





**Water** : not preserved

**Biota** : samples in RBINS departments

- Plankton : unidentified material
- Benthic invertebrates : identified material
- Fish : identified material

**Sediments** : 841 samples remaining,

**+/- 150 g each**



# Databases

- **Databank of sampling information :**  
“Explomer”
- **Database of biota :**  
“Southern North Sea Species Database”  
(SNSSD)

# SNSSD



**RBINS SAMPLE COLLECTION** Entry n° 17

Genus	species	var.		
Buccinum	undatum			
Conservatory	Preservative	Drawer or cup n°	Registration n° in "old list"	
80 L1 L3 6	in alcohol	4247	193	
Collected by	Identified by	# spec.	Age	Sex
GILSON	ADAM, P., 1947	3	1900s	
Termin. species name as found at the collection	Former identified by			
Record n°	Type excursion	Status sample		
3740	Exp. 1, Mer. 3 Cr.			
Remarks	Possible exsiccants. One of the shells is empty and is full of pars. See also sample with only a* 535.			

GO TO: LOCALITIES TAXA COLLECTION

CREATE: LOCALITY TAXON

- Sampling locality information
- Links : distribution maps, internet sites
- 2,200 entries

- Molluscs, Crustaceans, Fish and Echinoderms
- Evaluation of quality of preserved specimens
- Taxonomic revisions

**RBINS LOCALITIES** Entry n° 17

Record n°	Type excursion	Excursion n°	LATIT. 1	LONGIT. 1
2748	Exp. 1, Mer. 3 Cr.		51°26'20"N	2°34'E
ID n°	Locality or subject		LATIT. 2	LONGIT. 2
6198				
Date of record			LATIT. 3	LONGIT. 3
25/04/1906				
Hour of record	Depth of record	T° water	Wind direction	Current direction
Tide or flood	Depth of sea	Salinity	Water velocity	Current velocity
Substrate	Method of collecting			
	"Draguen" 8"			
Remarks	According to the notebooks of Gilson, the locality is described as "Plat-Hindat, Dragage circulaire de la Croix-Rouge bouée EOSE à ENE 200 m".			

GO TO: SAMPLE COLLECTION LOCALITIES MAPS

Var Loan



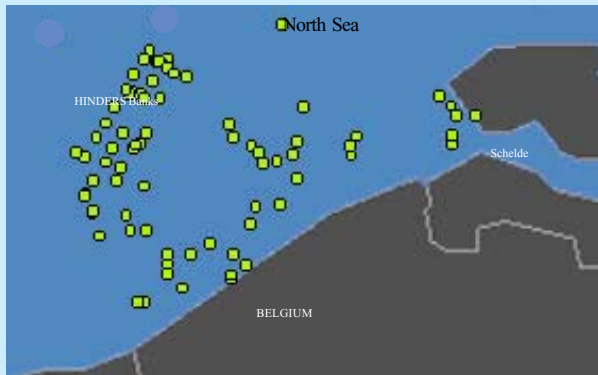


# Case studies

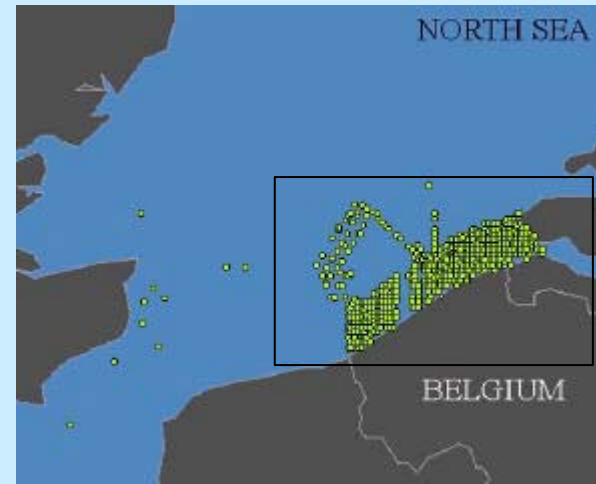
**Possible applications and limits?**



# 1. Historic distribution maps Neogastropods and Echinoderms



*Buccinum undatum* (1899 - 1914)



Sampling effort : “drague n°5” (1899 - 1914)

**Conclusion : Good preservation status and reliable sampling data  
Historic maps lead to interesting observations.**



## 2. Taxonomic revision of the genus *Ensis*



- Controversial taxonomic status
- Morphometric measurements :
  1. Taxonomic revision?
  2. Long term changes?

Conclusion : Specimen preservation status : good

Measurements performed



## 3. Genetic applications

**Are DNA extraction and amplification feasible?**

- **Formalin fixation : risks of DNA degradation**

**Tests : old specimens of *Littorina littorea*, *Ensis arcuatus* and *Ensis siliqua***

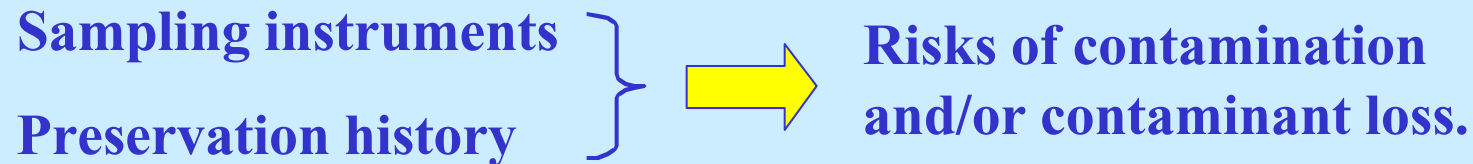
**Tests successful on *Ensis* spp.**

**Conclusion : Genetic applications possible**

**Case-to-case investigation necessary**



## 4. Contaminant analysis



- Alcohol preserved specimens : not reliable
- Dry shells : contamination during preservation ?
- Sediments : contamination during preservation ?

Analyses of trace metals in 20 sediment samples are ongoing  
Levels under detection limits.

Conclusion : Historic “reference levels” for trace metals in  
sediments?



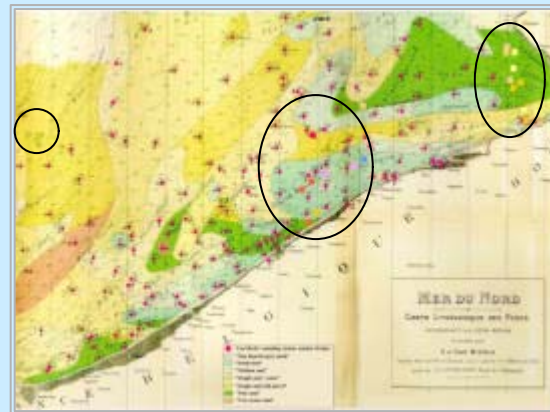
# 5. “Historic habitats” mapping

- 3000 sediment samples collected, 841 preserved
- Log-books : qualitative description of sediments, co-ordinates, depths, time and tidal status

## Reliable descriptions for historic habitat mapping ?

	Mud (pure)	< 63 µm ?
	Mud with sand	
	Mud with sand and shell remains	
	Mud with sand, shell remains and gravels	
	“Fine” sand (pure)	63-75µm < FS < 125 µm ?
	Fine sand with mud	
	Fine sand with mud and shell remains	
	Fine sand with shell remains	
	Fine sand with mud, shell remains and gravels	
	“Medium” sand (pure)	125 µm < MS < 250 µm ?
	Medium sand with mud	
	Medium sand with mud and shell remains	
	Medium sand with shell remains	
	Medium sand with mud, shell remains and gravels	
	“Coarse” sand (pure)	250 µm < CS < 500 µm ?
	Coarse sand with mud	
	Coarse sand with mud and shell remains	
	Coarse sand with shell remains	
	Coarse sand with mud, shell remains and gravels	
	Gravel (pure)	> 2mm.
	Fine gravel	
	Coarse gravel	

?



**Conclusion : An estimated 1000-1500 sediment data are usable**



# End products

- **Gilson-related bibliography**
- **Databases**
- **Historic distribution maps**
- **Quality evaluation report**
- **Publications**



# Conclusion

- **Impressive amount of available data**
- **Reliable sampling information and data**
- **Good quality of preserved specimens**
- **High scientific unexploited potential**



