

THE DRAKE EQUATION

$$N = R^* \times f_p \times n_e \times f_l \times f_i \times f_c \times L$$

Du paradoxe de Fermi
à l'équation de Drake,

Où sont-ils ?



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Leased Wire
Associated Press

Roswell Daily Record

RECORD PHONES
Business Office 2288
News Department
2287

OL IV NUMBER 161 REESTABLISHED 1946

ROSWELL, NEW MEXICO, TUESDAY, JULY 8, 1947

IN PER COPY

Roswell Hardware Man and Wife Report Disk Seen

The Roswell Hardware store in Roswell, N.M., today reported that it had seen a flying saucer. The store owner, Mr. J. H. ...

RAAF Captures Flying Saucer On Ranch in Roswell Region

The Roswell Ranch, N.M., today reported that it had captured a flying saucer. The ranch owner, Mr. ...

Claims Army Is Stacking Courts Martial

The Army today reported that it was stacking courts martial. The report came from ...

House Passes Tax Slash by Large Margin

The House today passed a tax slash bill by a large margin. The bill was ...

Security Council Paves Way to Talks On Arms Reductions

The Security Council today paved the way for talks on arms reductions. The council ...

No Details of Flying Disk Are Revealed

No details of the flying disk were revealed today. The report came from ...

Ex-King Carol Weds Mme. Lupescu

Ex-King Carol of Romania today wedded his second wife, Mme. Lupescu. The ceremony ...

Some of Soviet Satellites May Attend Paris Meeting

Some of the Soviet satellites may attend a meeting in Paris. The meeting is ...

Roswellians Have Differing Opinions On Flying Saucers

Roswellians have differing opinions on flying saucers. Some believe they are ...

American League Wins All-Star Game

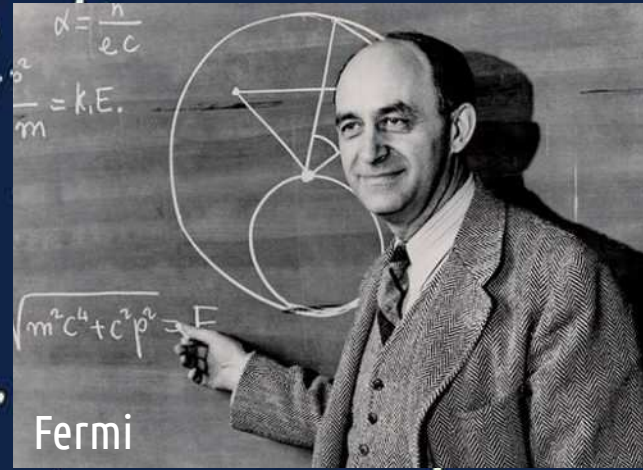
The American League today won the All-Star game. The game was ...

Deaths in Flood

Deaths in the flood today were reported. The deaths were ...

Deaths in Flood

Deaths in the flood today were reported. The deaths were ...



Fermi

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« Combien y a-t-il d'accordeurs de piano à Chicago ? »

Hypothèses

- il y a approximativement cinq millions d'habitants à Chicago ;
- en moyenne, il y a deux personnes par foyer ;
- en gros, un foyer sur vingt possède un piano qu'il faut accorder régulièrement ;
- les pianos accordés régulièrement sont accordés à peu près une fois par an ;
- un accordeur de piano met à peu près deux heures pour accorder un piano, en comptant le temps de déplacement ;
- un accordeur de piano travaille huit heures par jour, cinq jours par semaine, cinquante semaines par an ;

Calculs

- 5 millions d'habitants divisés par 2 personnes par foyer = 2,5 millions de foyers ;
- à chaque fois qu'il y a 20 foyers, il y a un piano, on divise 2,5 millions par 20 = 125 000 pianos accordés chaque année ;
- dans une année, l'accordeur travaille 50 semaines multipliées par 5 jours multipliés par 8 heures : 2 000 heures ;
- comme il accorde un piano en 2 heures, il accordera 1 000 pianos par an.
- comme il y a 125 000 pianos à accorder, il faudrait **environ 125 accordeurs de pianos à Chicago.**

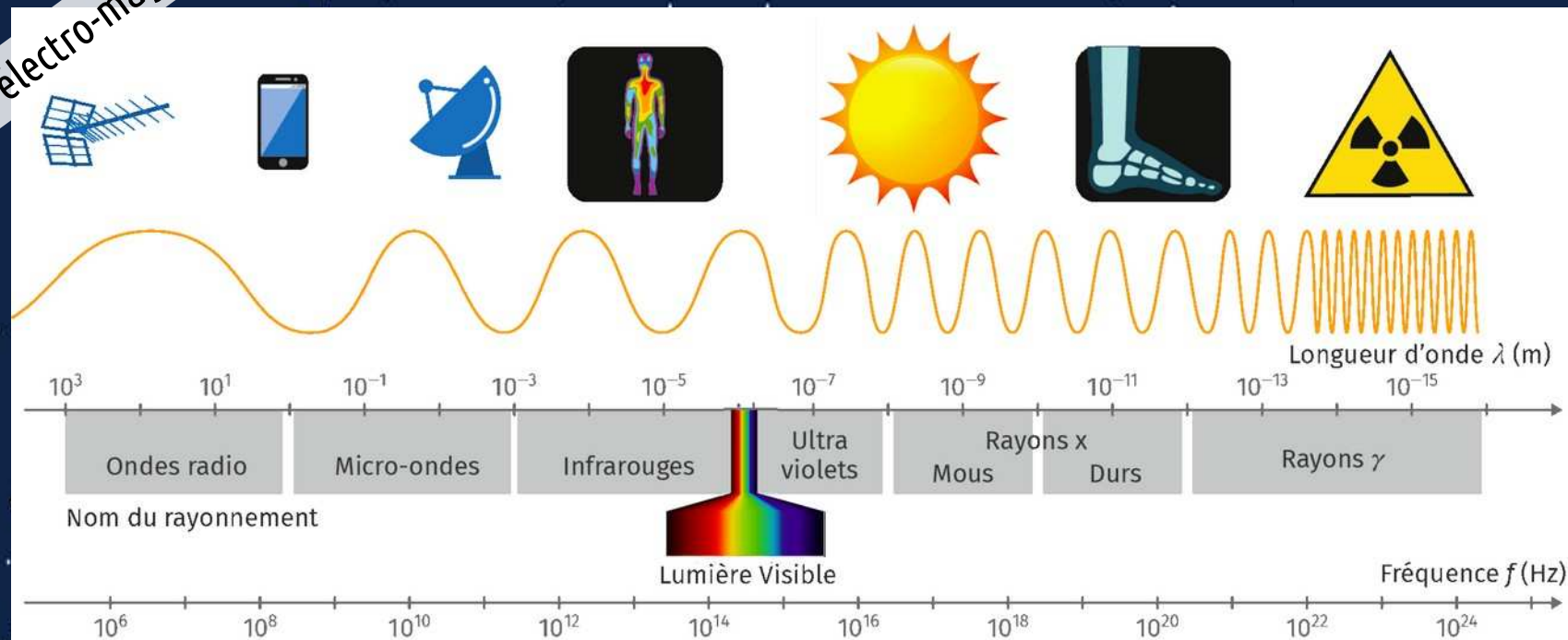
À l'époque → 190 accordeurs !



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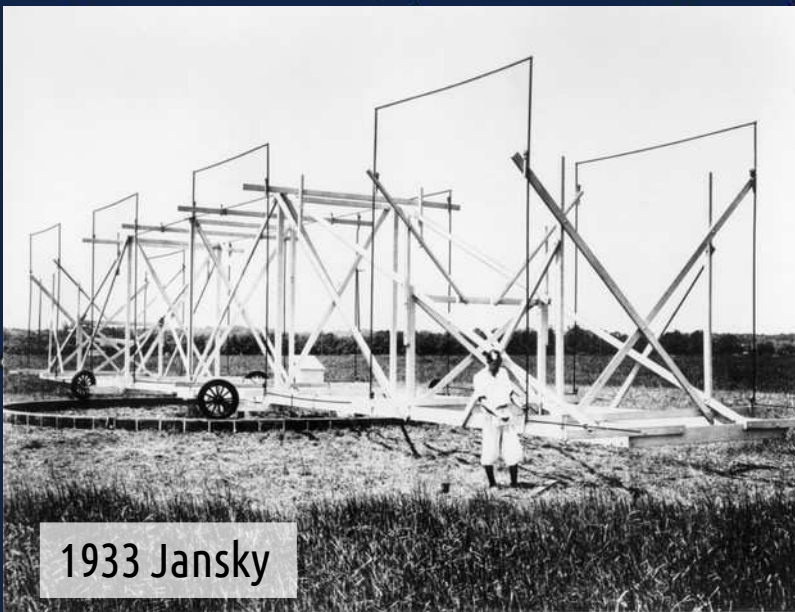
Les ondes électro-magnétiques



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Les débuts de la radioastronomie ...



1933 Jansky



1945 Groote Reber



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Frank Drake (1930-)

National Radio Astronomy
Observatory

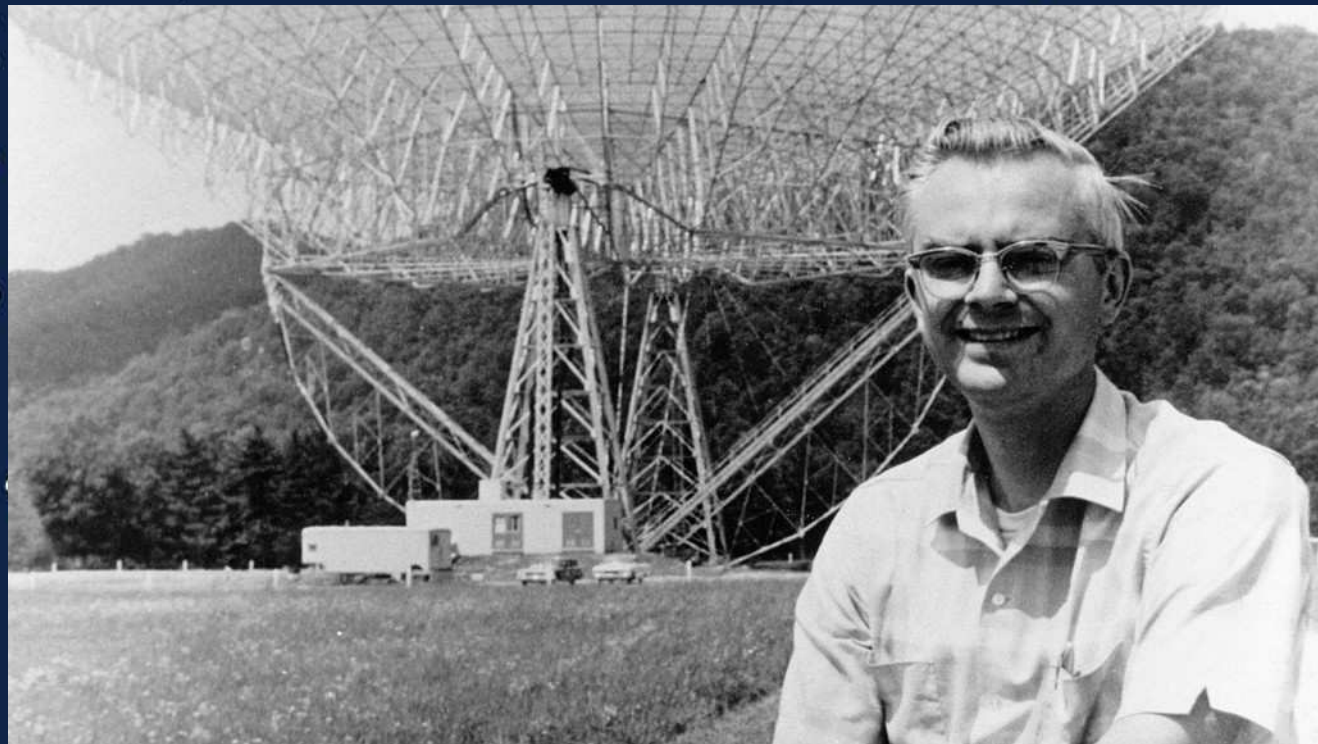
1960 projet OZMA

1961 conférence SETI-NRAO

Recherche sur les Pulsars

1972 message Pioneer

1974 message Arecibo



THE DRAKE EQUATION

What is the Drake equation?

It's an equation developed by Frank Drake, that have the propose of estimate the potential number of **intelligent alien** civilizations in the **our galaxy**.

$$N = R^* \times f_p \times n_e \times f_i \times f_c \times L$$

How it does work?

$$R^* \times f_p \times n_e \times f_i \times f_c \times L = N$$

the average rate of star formation **every year** in our galaxy

the fraction of those stars that **have planets**

the average number of planets that can **support life** in star that has planets

the fraction of planets that **actually develop life**

the fraction of planets with life that actually go on to **develop intelligent life**

the fraction of intelligent life that release detectable **signs of their existence in space**

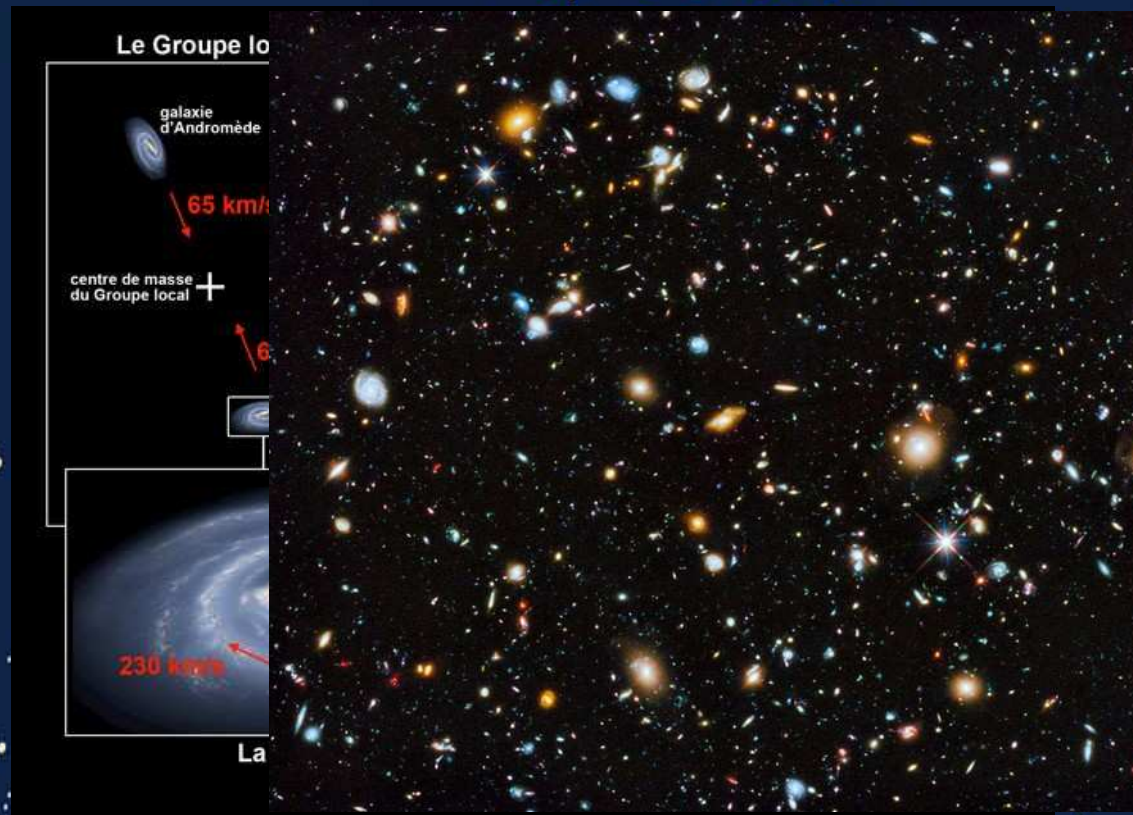
the expected lifetime of such a civilization for the **period that it can communicate** across the space

the number of civilizations in **our galaxy** with which communication might be possible



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THE DRAKE EQUATION

Puissances de 10

Réalisé par N. Braneyre

Photos du CERN, du CNRS, de IBM et de
Michael W. Davidson (The Florida State University)

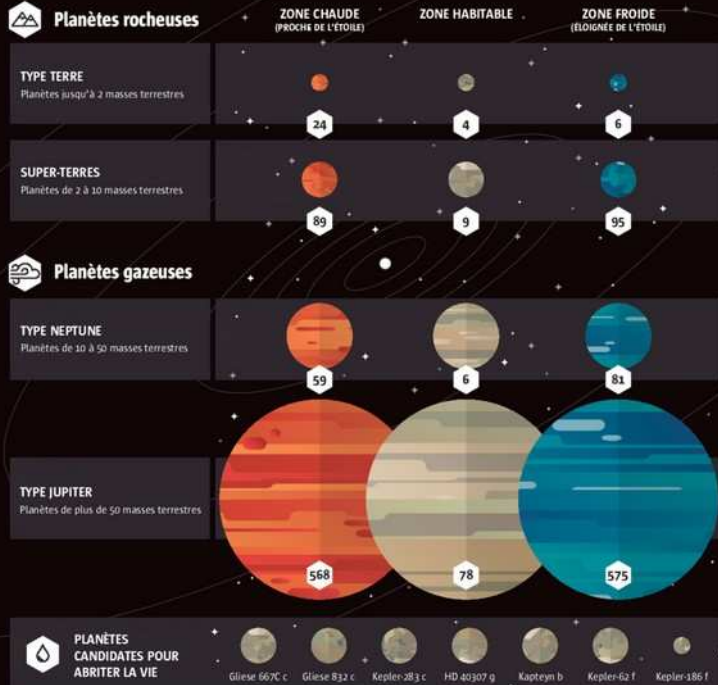


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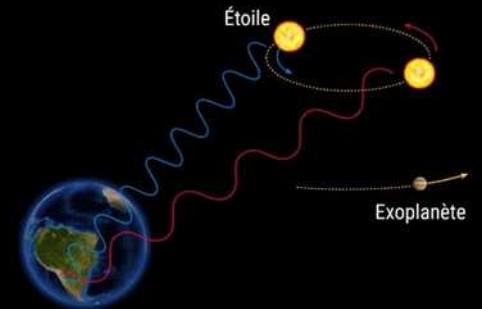
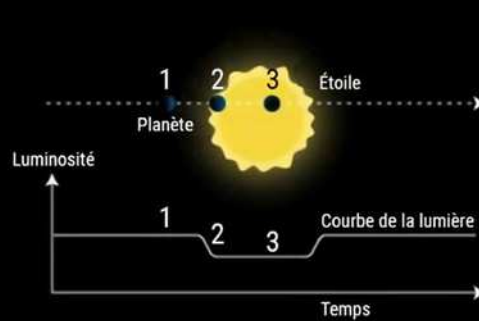
Les exoplanètes confirmées

Leur nombre à la date du 11 avril 2018



Catalogue d'exoplanètes PHL, Université de Puerto Rico à Arcebo

LES MÉTHODES INDIRECTES

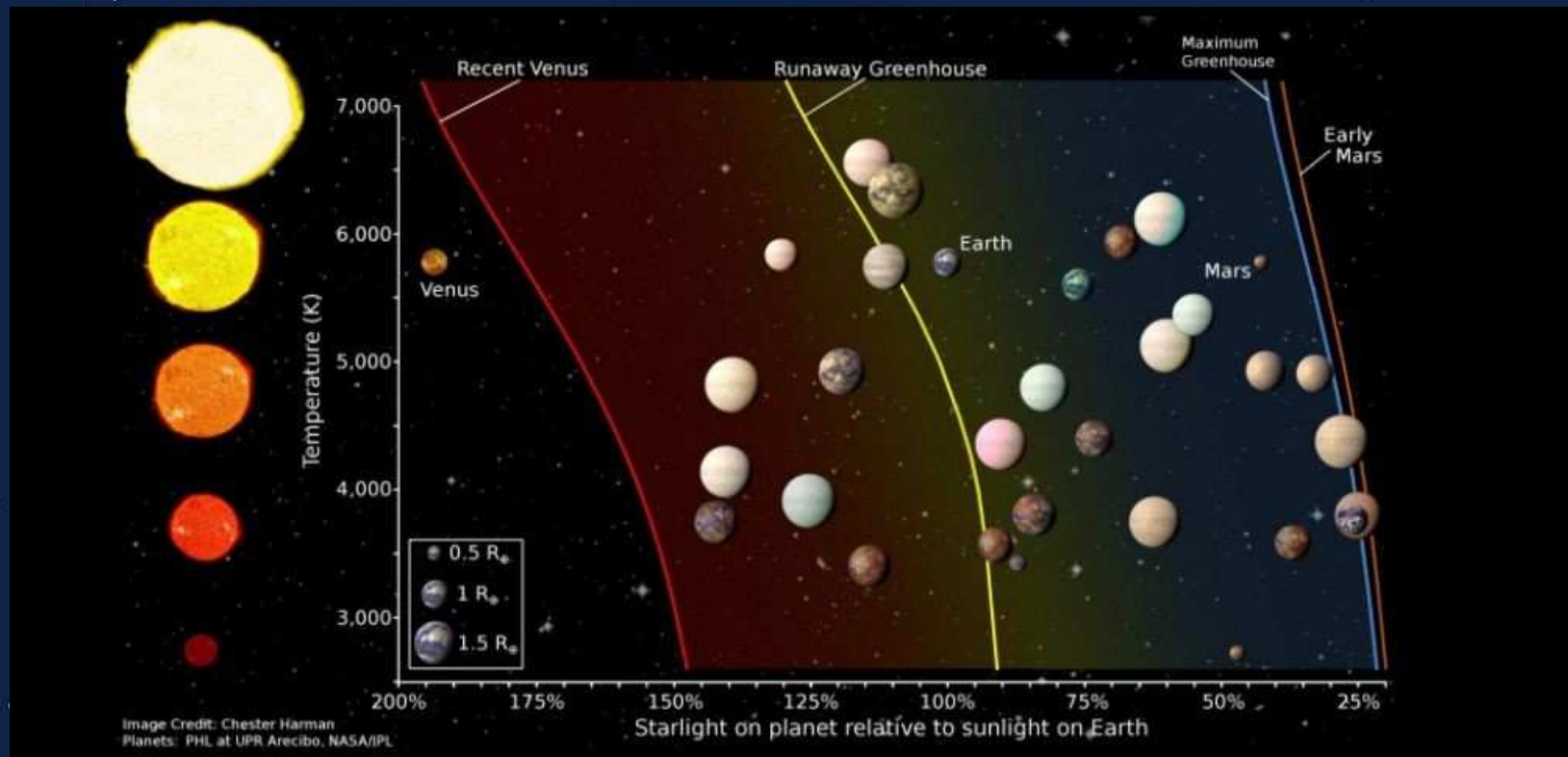


Principe de la méthode des vitesses radiales.
Source : ESO

f_p



THE DRAKE EQUATION

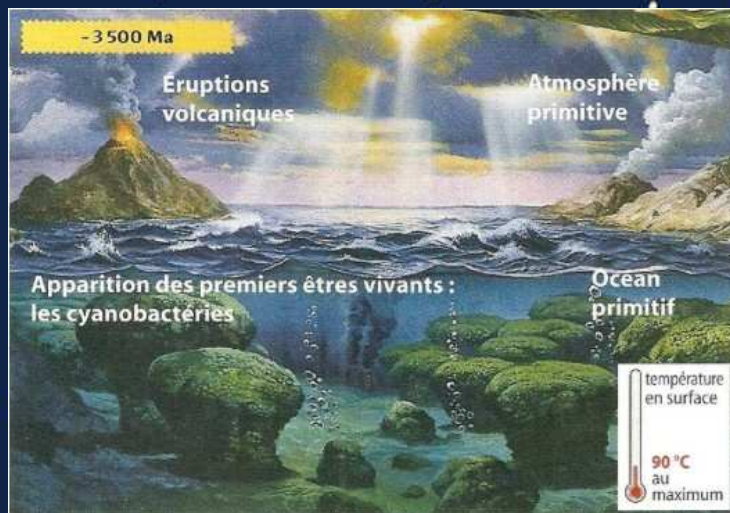


n_e



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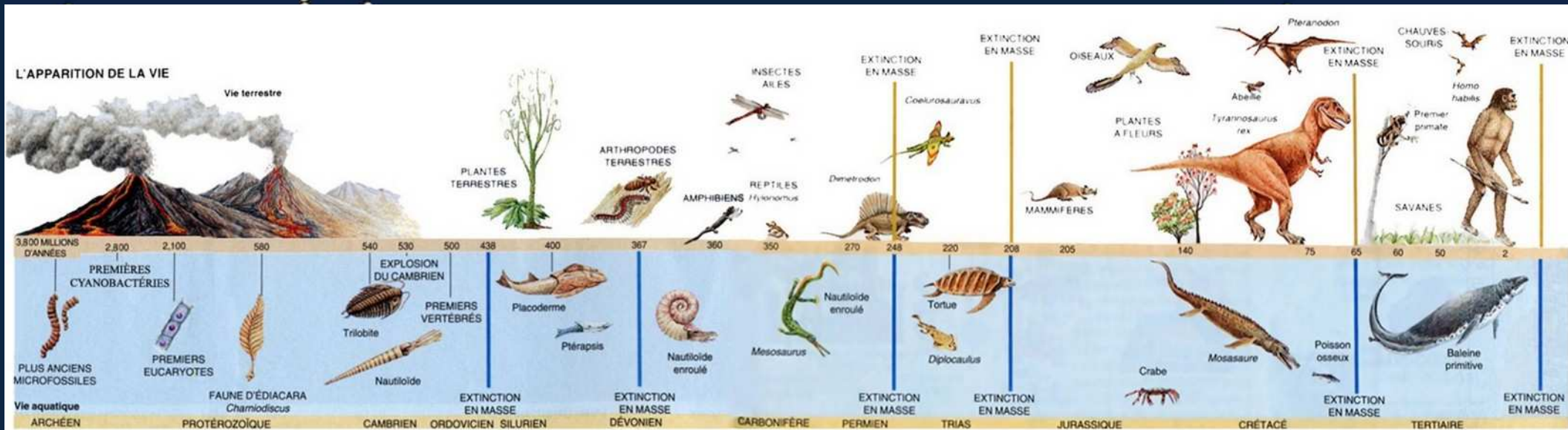


f_i



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adapté de : POUR LA SCIENCE - N° 206 DÉCEMBRE 1994

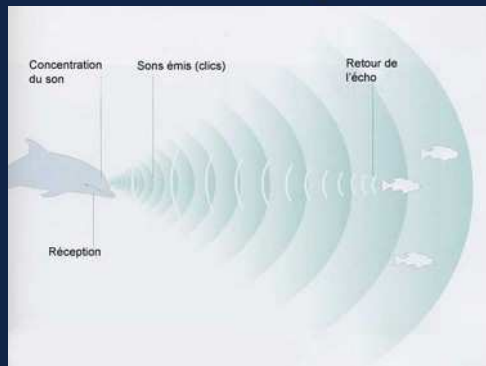
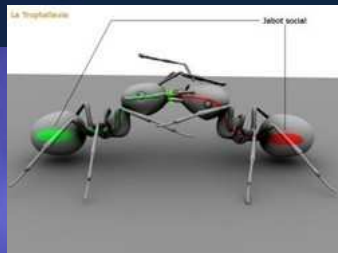
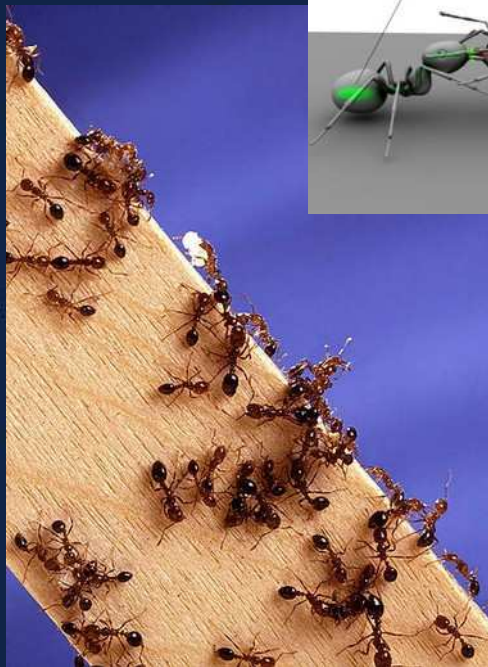
fi

CÉDRIC VANDEN DRIESSCHE
LYCÉE CHARLES DE GAULLE, CAEN



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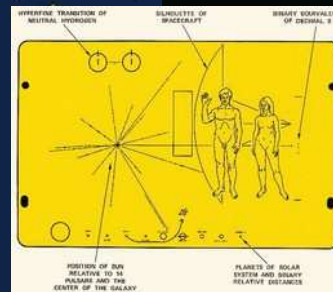
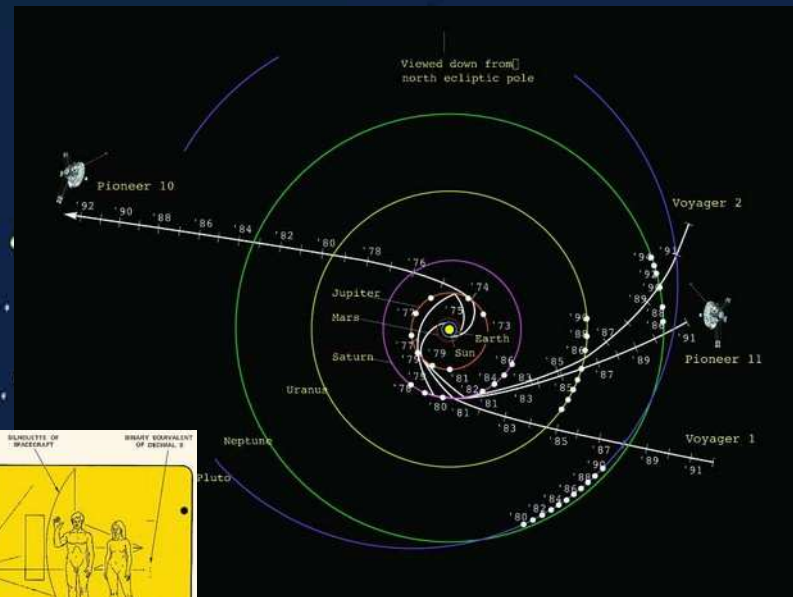


f_c



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f_c



THE DRAKE EQUATION

$$N = R^* \times f_p \times n_e \times f_l \times f_i \times f_c \times L$$



L



THE DRAKE EQUATION

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$N > 1$?

Où sont-ils ?

N



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Ils sont loin ...

$C = 300\,000 \text{ km /s}$

Avec le temps ...

