

DEVOIR DE FIN DE SEMESTRE N°2

A new refugee crisis has come to Europe

- 1- A train packed with hundreds of Ukrainians arrives in Przemysl, a city in eastern Poland, after several hours' delay. Nearly all are women and children, many of them exhausted and crying. At Medyka, the nearby border crossing, the situation is even more desperate. Tens of thousands of Ukrainians, as well as foreigners escaping Ukraine, queue on the Ukrainian side in the cold. Many have left their cars behind in heavy traffic and continued on foot.
- 2- Holding a bag in one hand, her young daughter's hand in the other, and carrying her toddler in a sling, Anastasia describes walking 17km to the border. She was greeted by chaos and impenetrable crowds. A young couple saw a village consumed by flames along the way. "It was hell," says Katya, recalling how her apartment in Kyiv shook as Russian bombs struck the city.
- 3- There are also heartening scenes. Ukrainians who live in the European Union (EU) are helping their compatriots when they arrive. They have turned up near the crossings, offering free transport and housing. Buses move the newly-arrived to schools and sports halls, now serving as shelters. Volunteers distribute clothing, sim cards, nappies and food. Thousands of Poles, Ukrainians living in Poland, have largely welcomed the Ukrainians, too. But foreigners fleeing Ukraine, especially those who are not white, have reported discrimination. In Przemysl, patrols of masked youths have harassed dark-skinned migrants and relief worker.
- 4- This is the kind of refugee crisis that Europe hoped never to see again. More than a million have already left Ukraine since the war began, the UN's refugee agency said on March 3rd. Around two-thirds are arriving in Poland, with Hungary, Moldova, Romania and Slovakia taking the rest. The European Union's commissioner for crisis management estimates 4 million people could flee Ukraine in the next five months. Millions more will take refuge in the country's west.
- 5- The EU's borders, which have gradually closed to most refugees since a big influx from Syria and Afghanistan in 2015-16, are opening up for Ukrainians. In contrast to 2015, when four-fifths of adult migrants from Syria and Afghanistan were men, the Ukrainians are almost all women and children. Ukrainian men aged 18-60 are subject to conscription and banned from leaving the country. Such rules create heartbreaking scenes at the border. Roman, a 19-year-old economics student from Kyiv, cradles a three-year-old outside a train station in Lviv. His wife Veronika will take their child into Poland; he is heading back, possibly into battle. Another man in Lviv, Siman, is a construction engineer who until recently has been working in France. He returned to Ukraine to bury his grandmother, but now finds himself obliged to take up arms. He is happy about it: "I am Ukrainian. I am ready. There is a first time for everything
- 6- The European Commission seems willing to let Ukrainians skip the red tape of asylum applications in favour of a new kind of status. On March 3rd member states looked

2. Sur la base des résultats d'une première série d'expériences et d'après la représentation de Lineweaver et Burk ($1/V_i = f(1/[S])$), on obtient les équations suivantes :

Equation de la droite $1/V_i = f(1/[S])$	Enzyme E _A	Enzyme E _B
$Y = a X + b$	$Y = 0.32 X + 0.008$	$Y = 0.05 X + 0.0025$

- a. Déterminer les valeurs du Km et de la V_{max} des deux enzymes E_A et E_B.
3. Dans une seconde expérience, un inhibiteur I₁ est ajouté à une concentration de 0.1 mM en présence de l'enzyme E_A. Dans une troisième expérience, un inhibiteur I₂ est ajouté à une concentration de 0.3 mM en présence de l'enzyme E_B.

Les représentations de Lineweaver et Burk $1/V_i = f(1/[S])$ ont permis d'obtenir les équations suivantes :

Equation de la droite $1/V_i = f(1/[S])$	Enzyme E _A	Enzyme E _B
Sans inhibiteur	$Y = 0.32 X + 0.008$	$Y = 0.05 X + 0.0025$
En présence d'inhibiteur I ₁	$Y = 0.008 X + 0.008$	-
En présence d'inhibiteur I ₂	-	$Y = 0.05 X + 0.005$

- a. Déterminer le type d'inhibition de chaque inhibiteur. Justifier la réponse.

Epreuve de Génétique

Exercice 1 (15 points)

Chez un champignon ascomycète à tétrades ordonnées, deux souches auxotrophes S1 [His⁻] et S2 [Gly⁻] ont été isolées. Le croisement de chacune des souches mutantes avec la souche sauvage a fourni les résultats suivants :

S1 × (+)						S2 × (+)
His ⁻	+	+	His ⁻	+	His ⁻	100% Asques
His ⁻	+	His ⁻	+	His ⁻	+	pré-réduits
+	His ⁻	+	His ⁻	His ⁻	+	
+	His ⁻	His ⁻	+	+	His ⁻	
302	298	130	100	90	80	

1. Interpréter les résultats de ces croisements.
- Le croisement des deux souches mutantes S1 et S2 entre-elles a fourni, sur 1000 spores analysées, 900 spores incapables de germer sur Milieu Minimum (Mm).
2. Interpréter le résultat de ce croisement et établir la carte génétique.

Par ailleurs une souche S3 double auxotrophe [Gly- Ade-] a été isolée. Le croisement S3 x S1 a fourni les résultats suivants :

66 spores [His+ Gly- ade+]; 86 spores [His- Gly- ade+]; 86 spores [His+ Gly+ ade-];
14 spores [His- Gly- ade-]; 334 spores [His+ Gly- ade-]; 334 spores [His- Gly+ ade+];
14 spores [His+ Gly+ ade+]; 66 spores [His- Gly+ ade-].

3. Interpréter les résultats de ce croisement en précisant les génotypes des deux souches croisées, si les gènes sont liés ou indépendants, l'ordre des gènes ainsi que les distances qui les séparent.
4. Calculez l'interférence I.

Exercice 2 (5 points)

Soient 3 souches Hfr d'*E. coli* qui, par conjugaison transfèrent leur matériel génétique suivant une séquence différente. On connaît le temps de pénétration de gènes marqueurs dans la souche F- réceptrice.

Les résultats obtenus sont les suivants :

Hfr 1	Marqueurs	His	Tyr	Met	
	Temps en mn	14	16	30	
Hfr 2	Marqueurs	Arg	Met	His	Trp
	Temps en mn	12	18	34	58
Hfr 3	Marqueurs	Trp	Tyr	Arg	Cys
	Temps en mn	3	29	49	63

Déterminer sur le chromosome bactérien l'ordre des gènes et leurs distances en minutes et schématiser pour chaque souche Hfr l'origine et le sens du transfert.