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Class: Grade 12 **(Socio-Eco.)** **Unified Test** **Duration:** 60 minutes
Subject: Biology **Mark:**

Answer the following exercises.

Exercise 1 (6 pts)

The document below shows the causes of certain nervous system diseases and their consequences on health.

Diseases	Causes and Consequences
Lateral amyotrophic sclerosis (LAS)	**Attack of certain cerebral neurons, which provokes difficulties in movements leading to gradual paralysis of all the body muscles.**
Parkinson disease	**Attack of certain cerebral neurons, which release a neurotransmitter, dopamine. Patients show tremors, muscles rigidity and difficulty in movements.**
Huntington chorea	**Attack of certain cerebral neurons, which provokes uncontrolled movements and mental capacities progressive deterioration.**

1- *Pick up from the document the similarities between all these diseases.*

L-dopa is a molecule converted into dopamine within the cerebrum. Chlorpromazine is a molecule that has a similar spatial structure to that of dopamine, and prevents the action of this latter at the level of the synapse.

2- *"L-dopa reduces the disorders observed in patients affected with Parkinson disease". Justify this statement.*

3- *Explain how chlorpromazine prevents the action of dopamine at the level of a synapse.*

4- *Indicate the consequences of injecting chlorpromazine into the cerebrum of a normal individual and into the cerebrum of an individual affected with Parkinson disease.*

Exercise 2 (9 pts)

In the framework of studying the effects of acetylcholine on the muscular activity, we isolate the right abdominal muscle of a frog and we keep it in an appropriate physiological liquid bath, then we perform the following two experiments.

1st experiment. We add acetylcholine, of different concentrations, in the physiological liquid bath then we record, for each concentration, the amplitude of the response. The results are shown in document 1.

Concentration of acetylcholine (in a.u)	0	1	2	3	4	5
Amplitude of the contraction (in a.u)	0	2.5	5	10	20	25

Document 1

1- *Construct the graph that shows the variation of the amplitude of the response as a function of the acetylcholine concentration.*

2- *Analyze the obtained results. What can you deduce concerning the variation of the muscle response?*

2nd experiment. We perform the same experiment, but we add to the physiological liquid bath a limited amount of curare before adding acetylcholine. The results are given in document 2.

Concentration of acetylcholine (in a.u)	0	1	2	3	4	5
Amplitude of the contraction (in a.u)	0	0	0	2.5	10	15

Document 2

3- *Analyze the results of document 2.*

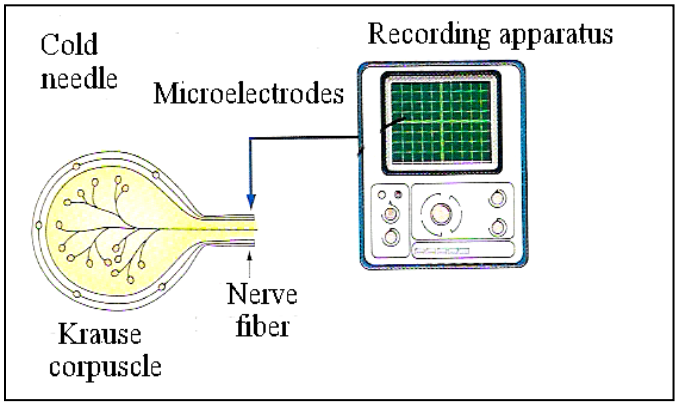
4- *Compare the amplitude of the contraction for the same acetylcholine concentration (3 a.u)* ***with*** *and* ***without*** *curare (document 2 and document1). What can we deduce concerning the role of curare ?*

Exercise 3 (5 pts.)

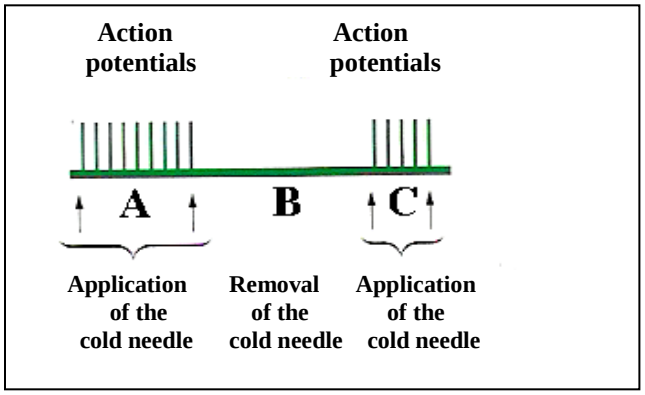
In the skin, there are nerve fibers linked to corpuscles called Krause corpuscles that are sensitive only to a certain temperature variation.

We isolate one of these Krause corpuscles, and we place on its nerve fiber microelectrodes connected to a recording apparatus that allows us to see, on a screen, the responses obtained when the temperature is changed, document 1.

We apply a cold needle to the corpuscle, then we remove the cold needle, and finally we apply the cold needle again. The responses recorded by the apparatus are presented in document 2.



Document 1. Experimental set up



Document 2. Obtained recordings

1- *Interpret the obtained recordings.*

2- *How will the recording A vary if we increase the intensity of the stimulus by making the needle colder?*