ST PAUL'S SCHOOL
JUNIOR SCHOLARSHIP EXAMINATION

BIOLOGY

NAME _____

MAY 2013

SECTION B – BIOLOGY

Animal migration is one of the great wonders of the natural world.

Some species travel staggering distances, returning to a precise location after many years.

European eels, which are found in many freshwater rivers across Northern Europe, begin life as eggs spawned in the Sargasso Sea, which is just off Bermuda in the Atlantic Ocean.

The young eels (See insert, Figure 1) are transparent and carnivorous, spending up to two years crossing the Atlantic to Europe, riding the currents.

1. Eels are classified as fish. Suggest three features glass eels have which distinguish them from snakes.

   i. ……

   …… [1]

   ii. ……

   …… [1]

   iii. ……

   …… [1]

2. Suggest why it is advantageous for the young eels to be transparent.

   ……

   ……

   …… [2]

When they arrive at an estuary on the Western shores of Europe, most of the eels swim up river, where they remain for 10-15 years. In the far north, inside the Arctic Circle, the eels tend not to go up river, but remain in the sea.

3. Suggest why this might be so.

   ……

   ……

   …… [2]

Every Autumn, vast numbers of adult eels simultaneously head back down river to the sea, on a 3,500 km journey back across the Atlantic to where they started life in the Sargasso.

It is thought that the European eel began this extraordinary migration, from the Sargasso Sea to Europe and back, a hundred million years ago when Europe was much nearer the USA. As continental drift pulled Europe away from the USA, the eels very gradually lengthened their migration across the ocean (Figure 2).

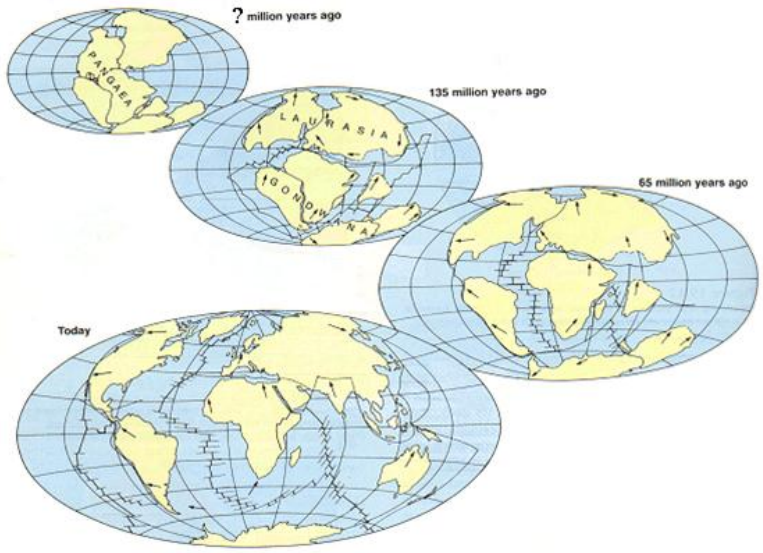


Figure 2. The movement of the continents over the last 150 million years

4. Which of the following, if true, would suggest that this explanation is unlikely to be correct?

   A. Eels first appear in the fossil record about 45 million years ago.

   B. An American eel, which lives in rivers on the East coast of the USA, also lays its eggs in the Sargasso Sea.

   C. Some species of tropical eel do not migrate from their spawning ground off Borneo.

   Circle your answer.

[1]

TURN OVER

Whatever the origin of their migration, the European eels have to overcome several fundamental challenges to complete their lifecycle.

5. In your opinion, what are the two most fundamental challenges the eels' lifecycle presents?

……

……

……

……

…… [2]

The eel carries out this round trip once in its life, but many other animals have an annual migration. One of the longest is the 20,000 km round trip between Britain and South Africa which the swift (a bird) completes every year.

Swifts arrive from Africa in Britain in late April. They build their nests, breed, and then leave in late July to fly back south.

6. Suggest why they leave Africa to spend summer in Europe.

……

……

…… [2]

Astonishingly, when the young leave the nest, they will not touch down voluntarily until they are ready to breed. They spend up to three years constantly in flight, safe from all predators. These small birds, about 15 cm long, drink, feed, and can even mate on the wing.

7. Suggest what they might eat.

…… [1]

8. What other basic behaviour must they somehow manage to do whilst airborne?

…… [1]

Once they set off on their migration route, they cover up to 1,000 km per day. Some have further to travel than others.

Here are some data on the average mass of birds leaving different European breeding sites in July, and the approximate distance they will travel south.

Breeding Site	**A**	**B**	**C**	**D**	**E**
Average mass of birds (g)	176	160	185	158	164
Migration distance (km)	10,200	8,600	12,400	8,400	8,800

9. Plot these data on the graph paper provided, and draw a line of best fit through the points. [3]

10. Using your graph, estimate the mass of birds which migrate 11,000 km.

…… [1]

11. What does the graph suggest about the relationship between bird mass and migration distance?

……

…… [1]

12. State the three basic processes the birds have to carry out in order to keep generating the energy required to fly.

……

……

…… [3]

13. Why do you think heavier birds might be more likely to survive a longer migration?

……

……

……

…… [3]

END OF BIOLOGY

BLANK PAGE

BLANK PAGE