**ASSESSMENT SCHEDULE**

**AS 91605 [Bio 3.5] Demonstrate understanding of evolutionary processes leading to speciation.**

**Evidence statement**

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| **ONE** | **Achievement** | | | | | | **Merit** | | | | | | **Excellence** | | | |
| **(a)** | **Species defined:**  A group of actively or potentially interbreeding individuals separated genetically from other such groups  **OR**  A group of organisms that interbreed successfully (produce fertile offspring) in natural environments.  **A** | | | | | | **At least TWO difficulties described and explained or exemplified** eg.   * lack of demarcation between sp and subsp eg. ring species * (successful) interbreeding between related species in captivity / gardens when one sp. is intro into the habitat of another eg *Canus sp,* many plants * lack of demarcation between sequential species   time  sp A sp B. sp C.   * Genetic Engineering has removed the species barrier to gene transfer.   Structural barriers to breeding between members of the same sp. eg. between individuals of large and small dog breeds.  **M** | | | | | | **Two or more difficulties described and explained or exemplified and linked to the definition of species**  **E** | | | |
| **(b)** | **Two RIMS described:**    **2A** | | | | | | **Two RIMS explained:**  eg.**geographic**: N & S Minke whales separated by warm equatorial waters, whales separated in different oceans  **behavioural:** mating songs, return to separated areas for mating etc.  **mechanical**: differences in size **etc M**  **must explain how interbreeding is prevented** | | | | | |  | | | |
| **(c)** | Blue whales, Humpback whales and Fin whales **are separate species** despite the existence of hybrids**. A** | | | | | | **2 of the 3 explanations below included:**   * Blue whale and Humpback whale species are separated (gene pools remain separate) by **hybrid infertility.** * Blue whale and Fin whale hybrids are **more distantly related** (they have an earlier common ancestor – see phylogeny) than Blues and Humpbacks (despite their being in the same Genus) thus it seems unlikely that they would hybridise.   Blue whales and Fin whales may not be separate species if hybrids are indeed fertile **M** | | | | | | **Blue whales and Fin whales species status evaluated**  i.e.  despite the occurance of a fertile (pregnant) hybrid the species status of these 2 whales depends on the viability (or fertility) of the F2 offspring.  If infertile the 2 species remain separate as a result of **selective hybrid (F2 ) inviability**.  NB  The existence of hybrids suggests that the 2 species are not separated geographically.  **E** | | | |
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| **N0** | | **N1** | | **N2** | | **A3** | | **A4** | | **M5** | **M6** | | | **E7** | **E8** | | | |
| No response or does not relate to the question. | | Describes ONE idea at the Achievement level | | Describes TWO ideas at the Achievement level | | Describes THREE ideas at the Achievement level | | Describes FOUR ideas at the Achievement level | | Explains TWO ideas at the Merit level | Explains THREE ideas at the Merit level | | | Discusses ONE idea at Excellence level | Discusses TWO ideas at the Excellence level | | | |
| THREE  (a) 1 | | | Evolutionary pattern identified or described. A  Example 1:  Co-evolution  **Or**  **Each species affects evolutionary change in the other** | | | | | | **Must identify or describe AND explain M**  Co evolution occurs where each species has a reciprocal evolutionary effect/each species acts as a natural selective influence on the other  In this case both species have evolved a co-dependence and require the other to complete their life cycle. | | | |  | | | |
| (a) 2 | | | Evolutionary pattern identified or described. A  Example 2:  Divergence or Divergent Evolution or Adaptive Radiation  **or**  **Evolution in which groups become more dissimilar** | | | | | | **Must identify or describe AND explain M**  **Divergence** results in populations (derived from a common ancestor) that become more dissimilar in response to differing environments (selection pressures). In this case this has occurred on different islands – geographically separated.  Differences in the isolated groups are reflected in the genetic make-up. | | | |  | | | |
| 1. 3 | | | Evolutionary pattern identified or described. A  Example 3:  Convergence or Convergent Evolution.  **or**  evolution in which species become more alike | | | | | | **Must identify or describe AND explain M**  Convergence occurs where 2 unrelated groups evolve similar adaptations because they occupy similar niches (are subjected to similar selection pressures).  In this case the ancestors of the various flightless birds were in different families i.e. unrelated. As a result of similar selection pressures / adaptations to similar niches the birds have evolved to resemble each other in many of their morphological characteristics. | | | |  | | | |
| (b) | | | 2 possible conditions described. (2xA)   * Lack of (mammalian) predators. * Available food at ground level. * Scarcity of food / intermittent food supply. * Major predators were other birds (eg. birds of prey, owls) * Environment contained no large plants / wind was likely to displace flying birds. * etc | | | | | | 2 explanations of how these conditions favoured flightlessness or of potential disadvantages (2xM)   * No need to escape from predators. (Lack of predators? Does this select-for or only allow flightlessness?) * Available food supply at ground level reduces the necessity to fly to get food (does this select-for or only allow flightlessness?) * Scarcity of food / intermittent food supply, selects-for lower metabolic rates and hence food requirements. * Scarcity of food / intermittent food supply, selects-for the ability to store food i.e. weight gain which means flying is less efficient. * Major predators were other birds (eg. birds of prey, owls) that selected for avoidance behaviour by hiding close to ground / in undergrowth. * Development of strong legs (for digging etc) were also useful in defence against predators, negating the necessity to fly * Large size gave defence against predators negating the necessity to fly * etc  Potential disadvantages:  * Vulnerability to predators * Lack of ability to migrate / move large distances / make use of distant food sources / use sparsely distributed food sources.   etc | | | | Explanations linked and disadvantages considered.  Flying requires a number of (expensive) weight-saving adaptations and a high metabolic rate that requires a high energy food intake**. E**  Flightlessness gave metabolic (less food needed) and other advantages that more than countered any potential disadvantages**. E** | | | | |
| N0 | | | N1 | | N2 | A3 | | A4 | | M5 | | M6 | | E7 | | E8 | | |
| No response or does not relate to the question. | | | Describes ONE idea at the Achievement level | | Describes TWO ideas at the Achievement level | Describes THREE ideas at the Achievement level | | Describes FOUR/FIVE ideas at the Achievement level | | Explains THREE points at merit level | | Explains FOUR/FIVE points at merit level | | **Explains ONE point at excellence level** | | Explains TWO points at excellence level | | |

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| **Judgement statement** | **Not Achieved** | **Achieved** | **Merit** | **Excellence** |
| **Score range** | **0-8** | **Minimum of 9 points** | **Minimum of 13 points** | **Minimum of 17 points** |

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| TWO |  |  |  |
| a. | **Colonisation:**  The migration of sufficient individuals to allow the establishment of a reproductively viable population, in this case a single seed that gives rise to a self-pollinating individual.  **Correct idea.**  **Do not accept:**  a pair or pregnant female **A** | **Explanation:**  **2 ideas:**  1. Isolated population / separated gene pool etc  2. subjected to / responds to different selective pressures in a new / unique environment  **M** |  |
| b. | **Terms correctly defined:**  autopolyploid**: A**  a polyploid that contains genetic material from one / single parental species.  alloployploidy **A**  a polyploidy that contains genetic material from two closely related species.  These occur through non-disjunction during meiosis/mitosis so that homologous chromosomes/chromatids do not separate**. A** | **Explanation has 2 or more of the following points:**   * Parental species is likely to be *C. cribbanus* because of its geographic proximity * Chromosome number has doubled (from 2n = 46 to 2n = 92) * It is unlikely that the *C. rupestris*  is an allopolyploid ie. A second parental species was not involved. **2M** | **Explanation as for merit**  **Plus evaluation of single plant with 138 chromosomes.**  Originated from the fertilisation of a normal (n=46) gamete and an unreduced gamete (2n= 92)  **And E**  evaluation of the potential of this single plant to give rise to a new species with a chromosome number of 138**. E** |
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| N0 | N1 | N2 | A3 | A4 | M5 | M6 | E7 | E8 |
| No response or does not relate to the question. | Describes ONE idea at the Achievement level | Describes TWO ideas at the Achievement level | Describes THREE ideas at the Achievement level | Describes FOUR ideas at the Achievement level | Explains TWO points at merit level | Explains THREE points at merit level | **Explains ONE point at excellence level** | Explains TWO points at excellence level |