

Assessment Schedule – 2011**Scholarship Biology (93101)****Evidence Statement****QUESTION ONE CCD : Evidence Statement**

Cause / spread of CCD (C)

Evidence of cause / spread		Justification	
CD	Bee's diet may lack diversity / lack of essential nutrients from monocropping / HFCS feeding in winter.	CD_J	malnourished bees may have a weakened immune system making them more susceptible to / less likely to fight off a IAPV / Nosema.
CN	Neonicotinoids / insecticides accumulates / builds up in bees from nectar / pollen / eating honey.	CN_J	(Build up of) insecticide kills adult bees (which eat honey) AND immature bees do not eat honey and therefore survive providing evidence neonicotinoids are linked to / matches symptoms of CCD.
CI	IAPV deprives bees of essential proteins / enzymes from breakdown of ribosomes.	CI_J	Paralysis / death results outside the hive providing evidence that IAPV is linked to / matches symptoms of CCD.
CV₁ CV₂ CV₃	<i>Varroa</i> is a vector for IAPV so it increases the spread of IAPV. <i>Varroa</i> wounds the bees which allows the entry of IAPV / Nosema . <i>Varroa</i> weakens the immune system so more likely to get infected by IAPV / Nosema .		
CF₁ CF₂ CF₃	<i>Nosema fungus</i> makes bees susceptible to infection so more likely to get IAPV . <i>Nosema fungus</i> makes them more susceptible to chemical attack linked to insecticides / neonicotinoids . <i>Nosema fungus</i> attacks the intestinal tract / poor processing of food causing malnutrition (which weakens their immune system).		
CG	lack of genetic diversity in American bees as they are descended from only four genetic lines.	CG_J	Honey bees (are all relatively genetically similar) so will be similarly susceptible / lack resistance / lack adaptations to IAPV / varroa / fungus which cause CCD.
		CT_J	Regular trucking of hives around America (may take infected bees into uninfected areas) so IAPV / varroa / fungus associated with CCD are spread (more rapidly). OR physiological stress makes the bees more susceptible to IAPV / varroa / fungus.
CH	Bees live in dense (large numbers in small area) colonies in hives / Many hives occur together in one yard / farm.	CH_J	Bees live in close contact in a hive increases chances / high chance of spread.

Analysis (A) of ecological impact of CCD on managed (M) and natural (N) ecosystems

	Evidence		Justification
MA	CCD is likely to have a major / greater / more of an impact on managed ecosystems (as these are dependent on bees for pollination of crops)	MA_{J1} MA_{J2}	<ul style="list-style-type: none"> • No pollination means no fruits / nuts / vegetables which means no / reduced food for humans / herbivores. • Flow on effect to food chains eg fewer herbivores so fewer carnivores
NA	CCD is likely to have a minor / lesser / no impact on natural ecosystems (as these are less dependent on bees for pollination / plants are wind pollinated / plants have other pollinators)	NA_{J1} NA_{J2} NA_{J3} NA_{J4} NA_{J5}	<ul style="list-style-type: none"> • No bee pollination may reduce numbers of some plants. • Flow on effect to food chains eg fewer herbivores / carnivores. OR Lack of honey for bears / named animal. • No / little effect on wind pollinated plants which may increase in numbers (as competitor reduced). • Flow on effect to food chains eg more herbivores / carnivores. • Natural pollinators are present and continue pollination. OR Increase in natural pollinators (as competition removed).

Judgement statement (2 areas are C and A)

8	6 J's (one each area) and 3 descriptions
7	5 J's (one each area) and 3 description
6	4 J's and 3 descriptions
5	3 J's and 3 descriptions OR 2 J's and 5 descriptions OR 1J and 7 descriptions
4	3 J's and 1 descriptions OR 2J's and 3 descriptions OR 1 J and 5 descriptions OR 7 descriptions
3	2 J's and 1 descriptions OR 1 J and 3 descriptions OR 5 descriptions
2	1 J and 1 description OR 3 descriptions
1	1 description
0	No evidence provided which is relevant to the question

QUESTION TWO Assessment Schedule: Amazonian Butterflies

	Evidence		Justification: role of relationship or process in producing large number of species / only a small number of phenotypes explained.
EA	Intraspecific competition: occurred in ancestral species through over population (of caterpillars feeding on one type of plant).	EA_j	Niche differentiation occurred / butterflies occupied vacant niches (by laying eggs / feeding on different plants reducing intraspecific competition).
EN	Selection pressures: from differences in new niches / habitats / environment (new plant types).	EN_j	The different selection pressures have led to genetic / phenotypic differences between the butterfly populations.
ER	Reproductive isolating mechanisms: results from lack of gene flow between butterfly populations.	ER_j	Sympatric speciation: speciation results – sympatric as no geographical barriers. OR speciation identified and description makes it clear it is sympatric.
ED	Divergent Evolution / adaptive radiation: As different species have evolved from a common ancestor / fill available niches.		
EE	Interspecific competition: occurs due to many butterfly species in the same area.	EE_j	Laying eggs / feeding on different plants allows butterflies to co-exist (by reducing interspecific competition).
ET	Mutations result in different traits / colour-pattern / phenotypes.		
EP	Predation by birds targets certain phenotypes.	EP_j	Acts as a selection pressure to remove other colour pattern / uncamouflaged phenotypes.
EM	Mimicry described: same colour patterns develop in different butterfly species (which may or may not be unpalatable).	EM_{j1} EM_{j2} EM_{j3} EM_{j4}	<ul style="list-style-type: none"> • Butterfly phenotypes which are considered unpalatable / camouflaged on flowers are not preyed on (and survive and reproduce). • Butterflies not preyed on their alleles increase in frequency in gene pool. • Butterflies with other phenotypes are preyed on by birds so will not survive. • Butterflies with other phenotype the alleles will be removed from gene pool.
EC	Convergent evolution: as different species have evolved similar (colour patterned) phenotypes.		
EO	Coevolution: relationship between host plant and butterfly species.	EO_j	Increase divergence in butterfly species as they coevolve with specific plant hosts.

Judgement Statement

8	7Js and 2 descriptions
7	6Js and 2 descriptions
6	5Js and 2 descriptions
5	4Js and 2 descriptions
4	3Js and 2 descriptions
3	2Js and 2 descriptions
2	1J and 2 descriptions OR 4 descriptions
1	2 descriptions
0	No evidence provided which is relevant to the question.

QUESTION THREE**Evolution of the Homos (H)** *H. sapiens* and *H. neanderthalensis*

	Evidence		Justification
HD	Divergent evolution / divergence from common ancestor / heidelbergensis .		
HP	Place of origin Neanderthal evolved in Europe (from heidelbergensis population that had already left Africa). AND Sapiens evolved in Africa (from heidelbergensis population that had remained in Africa)	HP_J	Neanderthal DNA is only found in populations of non African sapiens .
HS	Different selection pressures from different climates cold in Europe / hot in Africa.	HS_{J1} HS_{J2}	<ul style="list-style-type: none"> • Neanderthals were short and stocky as an adaptation to reduce heat loss / had large noses which warms air as it enters the body. • sapiens were being tall and thin as an adaptation to facilitate heat loss.
HI	Inter breeding occurred between Neanderthal and <i>sapiens</i> .	HI_{J1} HI_{J2}	<ul style="list-style-type: none"> • 4% of Neanderthal DNA found in (non-African) <i>sapiens</i>. • Reproductive isolating mechanisms / Postzygotic barriers not established yet OR They may never have been two distinct species.

Reasons (R) why Neanderthal became extinct while *sapiens* did not.

	Evidence		Justification
RC	Climate becoming warmer described.	RC_J	Warming of climate too rapid / ice age ended for cold adapted neanderthals to survive. OR Warming of climate meant food sources such as large herbivore / mammoths were no longer available.
RB	Sapiens brain / memory more developed described, eg greater logic and reasoning ability as well as ability to communicate.	RB_J	This enabled sapiens to innovate / new ideas / learning / planning so better able to eg plan and coordinate for successful hunting / make more sophisticated tools.
RF	Food sources different described, eg neanderthalensis ate predominantly meat while <i>sapiens</i> were omnivores.	RF_J	<i>Sapiens</i> were able to utilize a greater range of / new food sources.
RT	Tools more sophisticated / complex / elaborate in <i>sapiens</i> .	RT_J	<i>Sapiens</i> able to hunt more efficiently / use more parts of the animal / create better shelters.
RG	Sapiens were generalists / Neanderthal specialist described.	RG_J	<i>Sapiens</i> were able to adapt to a variety of niches while when there was change neanderthalensis was specialised to their niche and unable to adapt.
RO	Outcompeted by <i>sapiens</i> described.	RO_J	Too much niche overlap, eg same food, habitat meant they couldn't co-exist so <i>sapiens</i> outcompeted the Neanderthal causing their extinction.

Judgement statement

8	7 J's and 2 descriptions
7	6 J's and 1 description
6	5 J's OR 4Js and 2 descriptions
5	4 J's OR 3Js and 3 descriptions OR 2Js and 5 descriptions
4	3 J's and 1 description OR 2Js and 3 descriptions OR 1 J and 5 descriptions
3	2 J's and 1 descriptions OR 1J and 3 descriptions OR 5 descriptions
2	1 J and 1 descriptions OR 3 descriptions
1	1 description
0	No evidence provided which is relevant to the question