

# HL IB Psychology

## Hormones & Pheromones – Animals

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## Two Key Studies of Hormones & Pheromones: Animals

### Key Study One: Shivley et al. (2005)

#### Key Study: Hormones (animals): Shively et al. (2005)

**Note:** You learned about **hormones** in the SL Biological Approach (see the RNs on this site which cover the topic) using research by Zak et al. (2009) and Morhenn et al. (2008) which both investigate hormones in humans. This key study looks at the stress hormone cortisol in macaque monkeys so make sure that you **DON'T** use it when answering a question on hormones in relation to human behaviour – i.e. only use the research on this RN for a HL Extension question on Paper 1 Section B

**Aim:** To consider the extent to which **stress** (seen via heightened **secretions** of the stress **hormone**, **cortisol**) is linked to **obesity** and illness in macaque monkeys. Stress may contribute to the over-production of **glucose** which, if not burnt off by the body, is stored as **fat cells**, becoming visceral fat. Visceral fat may lead to obesity in particular body regions such as the abdomen and is particularly harmful to health (for both humans and monkeys) as it tends to bind around internal organs which in turn creates a range of health issues e.g. **coronary health** problems

#### Procedure:

A **review article** based on the findings of several pieces of research on the topic

#### Results:

- The article found that female monkeys are used widely in research of this topic as they have shown themselves to be particularly vulnerable to **social stress**: they are highly sensitive to **social hierarchies**: e.g., who is the most **dominant** monkey, who is the next dominant, and so on down the hierarchy with decreasing dominance and increasing **subordination**
- Subordinate monkeys in typical monkey packs tend to have higher levels of cortisol, the stress hormone, in their system; they tend to be the victims of higher-status monkey's **aggressive** acts; they are groomed less by other monkeys; they spend more time in isolation than other monkeys
- Thus the lower-status subordinate female monkeys experience **long-term and intense** levels of social stress on a daily basis
- Several studies reviewed by Shively et al. showed that there appears to be a link between social stress and visceral obesity: the subordinate female monkeys had higher levels of cortisol which can itself lead to an 'emergency' storing of energy in fat cells; they had a higher number of fat cells than other monkeys; higher **cholesterol**; a higher risk of heart disease and **ovarian dysfunction**
- The affected females also showed a higher **sympathetic nervous system** functioning (e.g. raised heart rate) which could in turn damage their **artery walls**

**Conclusion:** Female macaque monkeys who have elevated levels of cortisol may be vulnerable to obesity which in turn could impact their health.

**Key terms: Cortisol Visceral Fat Social Hierarchies**

## Evaluation of Shiveley et al. (2009)

### Strengths

- Macaque monkeys and humans share 93% of their DNA so these findings have some useful **generalisability** and may help to inform future interventions for **treating obesity** in humans
- A review article allows the researchers to consider a wide range of studies which increases both **reliability** (large **sample size** and **statistical power**) and **validity** (large sample size and more likely to be **representative**) of the findings

### Limitations

- The studies reviewed in the article are all **correlational** so **cause-effect** cannot be established
- Due to the fact that monkeys were used in the research there is still no way of determining full generalisability: stress may operate differently in monkeys than it does in humans

## Key Study Two: Martin et al. (2005): The Role of Pheromones in Red-backed Salamanders & Territoriality

### Key study: Pheromones (animals): Martin et al. (2005)

**Note:** You learned about **pheromones** in the SL Biological Approach (see the RNs on this site which cover the topic) using research by Zhou et al. (2014) and Hare et al. (2017) which both investigate pheromones in humans. This key study looks at pheromones in red-backed salamanders so make sure that you **DON'T** use it when answering a question on pheromones in relation to human behaviour - i.e. only use the research on this RN for a HL Extension question on Paper 1 Section B

**Aim:** To investigate the extent to which pheromones are linked to **territorial behaviour** in male red-backed salamanders

**Subjects:** 30 male red-backed salamanders, collected from a forest near to the University of Virginia. The salamanders were kept in **lab conditions** for 4 months before the experiment and then afterwards they were returned to the forest

### Procedure:

The procedure was instigated to determine the territorial behaviour of the salamanders as it is thought that they are able to detect the pheromones of conspecifics (members of the same species). Territorial

behaviour is any behaviour which involves the animal defending its environment from possible intruders (which is more likely to happen if the intruder is also male)

Each salamander was placed in an **experimental chamber** for 5 days so that it could establish territoriality over the space. On the sixth day, the salamander was exposed to the following conditions:

1. the salamander was exposed to male pheromones on filter paper inside a **petri dish**
2. the salamander was exposed to no pheromones at all (**control condition**)
3. the salamander was exposed to female pheromones on filter paper inside a petri dish

The salamander was placed within the experimental environment with the petri dish within reach. The researchers observed each salamander for the following territorial behaviours: number of **nose taps** to the petri dish and/or the filter paper; **threat** behaviours such as extended limbs, an arched back, a raised tail

#### Results:

The male salamanders were able to distinguish both male and female pheromones outside the petri dish from the control condition, and they responded more threateningly toward male pheromones than from those of the female salamanders

**Conclusion:** Red-backed male salamanders may use pheromones to detect territorial threats, particularly from other male salamanders

## Evaluation of Martin et al. (2005)

### Strengths

- By keeping all the salamanders in lab conditions for 4 months the animals began the experimental phase with the same **baseline level** of time in captivity which increases the **reliability** of the findings
- The findings support the hypothesis that red-backed salamanders use pheromones to protect their territory which has some **generalisability** to other animal species e.g. cats, bulls, horses

### Limitations

- The behaviours observed by the researchers may not have been the result of territoriality: **other factors** may have produced the aggressive behaviour e.g. anxiety, over-excitability, the effect of incarceration after living in captivity after a lifetime in the wild
- The study only used male salamanders so the findings are not fully generalisable to female salamanders and have little generalisability for humans



### Worked Example

## EXTENDED RESPONSE QUESTION (ERQ) 22 MARKS

The question is, 'Evaluate research into the use of animal models to provide insight into human behaviour'. [22]

The following paragraph cites Shively et al.'s (2009) research. Note how the study is summarised in this paragraph, with key evaluative points highlighted. By following this example you could use a range of studies in one answer rather than using just two in more depth - the choice is yours when you have a generic question such as this one.

*One study which uses animals to give insight into human behaviour is a review article conducted by Shiveley et al (2009). The researchers reviewed a large number of studies to investigate the extent to which social stress may be linked to obesity and related health issues. The research found that there may be a link between social stress and visceral obesity in macaque monkeys. However, the nature of publication of animal research means that there may be some levels of publication bias as so much data from animal studies remains unpublished and this could mean that the link has become overstated. Moreover, the findings only point to correlation, not causation between the key factors. The use of animal studies cannot be generalised fully to human beings so the findings remain theoretical in terms of how useful they are when applied to people*