

## How Science Works: Irreducible Complexity - Teachers' Notes

Class	Set	No. in Class	Staff
10 11	1 2 3 4 5 6 Mixed Ability	B: G: SEN: EAL:	
<p><b><u>Learning Outcome(s)</u></b></p> <p>Pupils should learn:</p> <ul style="list-style-type: none"> <li>▪ How explanations of many phenomena can be developed using scientific theories, models and ideas.</li> <li>▪ To [...] develop an argument and draw a conclusion, using scientific and technical language.</li> <li>▪ How uncertainties in scientific knowledge and scientific ideas change over time and about the role of the scientific community in validating these changes.</li> </ul> <p><b><u>Context and Starter</u></b></p> <ul style="list-style-type: none"> <li>▪ Run the looping Powerpoint presentation and explain the learning outcomes for the lesson.</li> <li>▪ See: '<b>How did life get here – by design or by chance?</b>'</li> </ul> <p>This DART activity introduces the controversy over the origin of molecular systems with a media article from '<i>The Guardian</i>'. Cognitive conflict is introduced as pupils are challenged to examine one professional scientist's dissent over Darwinian evolution.</p> <p>Volunteers to hand out the sheets. Allow 3 minutes silent reading time. Then invite peer discussion with a 'tell each other' strategy. Remain visible at the front and pose each of the questions for pair discussion, waiting roughly fifteen seconds before asking for a 'hands up' response from one of the pairs – directed to the whole class.</p> <p><b><u>Main Activity</u></b></p> <ul style="list-style-type: none"> <li>▪ Pupils consolidate their answers by writing in the spaces provided on the sheet. Ask them to answer in as much detail as possible.</li> </ul> <p><b><u>Transition</u></b></p> <ul style="list-style-type: none"> <li>▪ Organise the pupils into groups of 3-4 learners. Hand round or project the concept cartoon: '<b>Bacterial Flagellum</b>'. If given as handouts, allow one per pupil to stick into their books. Explain they are going to be given 10 minutes to discuss this cartoon in their groups</li> </ul> <p><b><u>Second activity</u></b></p> <ul style="list-style-type: none"> <li>▪ Try to spend one minute sitting with each group in the class and offer some original thoughts. Elicit a response to the cartoon from each group. Which scientist do they agree with and why? Do they agree with more than one? Ask them to write their thoughts underneath the cartoon.</li> </ul> <p><b><u>Plenary</u></b></p> <ul style="list-style-type: none"> <li>▪ Round up the discussion. Ask three or four people to read out their written thoughts to the whole class. Offer feedback on the role of the scientific community in validating scientific ideas. Set the homework and ask the pupils to pack away.</li> </ul>		<p><b>Date:</b>      <b>Day:</b></p> <p><b>Period Length: 50 min</b></p> <p><b><u>Key Vocabulary</u></b></p> <ul style="list-style-type: none"> <li>▪ Nanotechnology</li> <li>▪ Irreducible complexity</li> <li>▪ Teleology</li> <li>▪ Intelligent Design</li> <li>▪ Bacterial flagellum</li> <li>▪ Micro-evolution</li> <li>▪ Natural selection</li> </ul> <p><b><u>Resources</u></b></p> <ul style="list-style-type: none"> <li>▪ Data projector</li> <li>▪ DARTS</li> <li>▪ Concept cartoons</li> <li>▪ Internet for H/W</li> <li>▪ Glue</li> <li>▪ Laptop/Desktop PC</li> <li>▪ Powerpoint</li> </ul> <p><b><u>Differentiation</u></b></p> <ul style="list-style-type: none"> <li>▪ Ask more able learners to generate a set of three questions that they would most like to ask an Intelligent Design theorist.</li> <li>▪ Ask lower ability learners to underline key words in the DART</li> </ul> <p><b><u>LSA Deployment</u></b></p> <ul style="list-style-type: none"> <li>▪ Can help organise the groups of three</li> <li>▪ Can help hand out the DARTS</li> </ul>	
<p><b><u>Homework</u></b> – Irreducible complexity has sometimes been illustrated using a mousetrap. Research this on the internet and write 150 words summarising arguments for and against.</p> <p><b><u>Homework Due in</u></b> – Set appropriate date.</p>			