

FERN SIMPLE VERSION

		REEL	SOUND EFFECTS
1. Since the earliest of times, ferns have been appreciated for their beauty and have provided shelter and sometimes, food.	BUSH SCENE Pan down from bridge to the tree ferns below and to the stream Reel 2 04:01:04 to 01:14 OR <u>Reel 2 04:01:50</u>	LJ002 04:01:03:19- 04:01:13:23	
2. The birth of their young, coiled fronds.....	TREE FERN Top of fern with opening fronds. <u>Reel 2 04:05:49</u> Fern leaflets opening <u>Reel 6/7 06:30:22</u>	LJ002 04:05:48:19 04:05:53:03 LJ006 06:30:21:24 06:30:25:20	
3.....has often been used in art work such as the Koru.	KORU: two koru simple koru <u>Reel 6/7 07:00:22</u> Double koru <u>Reel 6/7 07:01:02</u>	LJ007 07:00:22:22 07:00:26:07 LJ007 07:01:01:20 07:01:05:10	
4. Ferns are popular in our parks and gardens.....	WINTERGARDEN <u>Reel 6/7 06: 20:50 (outside)</u> OR <u>Reel 6/7 06:23:41 (inside)</u>	LJ006 06:20:50:22 06:20:56:04	
5.and even brought indoors to enhance our living space.	HENDERSON MALL <u>Reel 6/7 06:30:05 to 30:15</u>	LJ006 06:30:07:18- 06:30:16:07	
6. There are as many as 12,000 species of ferns throughout the world. Some are the size of your finger nail while others are as tall as a tree.	BUSH Close up of frond and then a pan across tree fern gully.	LJ004 04:04:17:15 04:04:29:00	
7. In the wild, ferns are successful at reproducing and spreading throughout the forest. They do this by producing spores			
8.			

<p>9. If a fern frond, is turned over.....</p>	<p>MATURE FERN LEAVES, TOP Focus now swings up from the rhizome to the leaves above. CHANGE: reel 1 04 18:50</p>	<p>LJ002 04:18:51:10- 04:19:04:15 * ANDREW*</p>	
<p>10. small circular areas may be seen.</p>	<p>MATURE LEAVES, BOTTOM Focus is not on the sori.</p>		
<p>11. Each of these circular areas.....</p>	<p>ANIMATION: IMMATURE LEAF FROM BELOW</p>	<p>FAM 01:01:07:00 01:01:48:00</p>	
<p>12. contains many small spore cases.</p>	<p>INSIDE THE SORUS: YOUNG SPORANGIA</p>		
<p>13. In some ferns, spore cases are exposed.</p>	<p>UNCOVERED SORUS</p>		
<p>14. In others, the spore cases are protected by a cap.</p>	<p>OVER THE SORUS: A PELTATE INDUSIUM Covering shown first, then taken away to show attachment, then returned.</p>		
<p>15. In some ferns this covering is bowl- shaped.</p>	<p>BOWL SHAPED INDUSIUM</p>		
<p>16. Over several months the spore cases will mature and turn brown. Inside each spore case there are several dozen spores. The release of these spores begins when water evaporates from a band of cells.</p>	<p>SORUS ON LEAF Group of sporangia. Single sporangium rotating to show the annulus. Water vapour leaving the annulus cells.</p>	<p>FAM 01:15:35:00 01:16:00:00</p>	
<p>17. As a result, the band shortens much like an accordion and</p>	<p>SPORANGIUM: ANNULUS MOVING Annulus band beginning to shorten. [cut close up of wall pulling inward]</p>	<p>FAM 01:16:19:00 01:16:38:00</p>	
<p>18 tears the jacket cells apart.</p>	<p>TEARING APART OF THE SPORANGIUM WALL Water molecules continue to leave. Sporangium jacket cells slowly begin to rip. Blue water pulling on outer walls</p>		

<p>19 . As the tear enlarges, the spore case opens.</p>	<p>ANNULUS MOVES BACKWARD SLOWLY Water molecules continue to leave Jacket cells slowly complete ripping. Sporangium halves fully separated. A small amount of water pulling on the outer walls.</p>		
<p>20. When all the water is gone from the band, it snaps forward, throwing out the spores.</p>	<p>TOP OF SPORANGIUM MOVES FORWARD FAST Outer walls of annulus cells spring outward to their original location.</p>	<p>FAM 01:16:44:00 01:17:04:00</p>	
<p>21. This process is repeated in thousands of spore cases on a leaf, releasing large quantities of spores</p>	<p>LEAF: SPORES BEING RELEASED</p>		
<p>22. Carried by the wind, some spores will land on a moist surface and absorb water.</p>	<p>MANY SPORES GERMINATING Many spores landing on a surface together.</p>	<p>FAM 01:17:10:00 01:17:20:00</p>	
<p>23. A filament emerges and attaches the spore to the soil.</p>	<p>FIRST RHIZOID Focusing on the trilete ridge Ridge un-zips A long rhizoid emerges and grows .</p>	<p>FAM 01:17:20:00- 01:17:43:00 speed x2</p>	
<p>24. This is followed by a tiny, heart-shaped plant.</p>	<p>BEGINNING OF PROTHALLUS Emergence of a finger of tissue Growth at the margins A gradually broadening sheet of cells</p>		
<p></p>	<p>FORMING THE HEART-SHAPED PROTHALLUS [cut first bit where camera follows and flies over notch]</p>	<p>FAM 01:17:55:00 01:18:01:00 crossfade</p>	
<p>25. This simple plant absorbs water and is photosynthetic.</p>	<p>MATURE HEART-SHAPED PROTHALLUS Prothallus growing out at us sequence. .</p>		
<p>26. Numerous filaments firmly attached it to the soil surface.</p>	<p>SIDE VIEW OF PROTHALLUS From side to show rhizoids at posterior end</p>	<p>FAM 01:18:10</p>	

27. Male reproductive structures, or sperm cases, are formed at one end of the plant.....	ANTHERIDIA Several antheridia are seen amongst the rhizoids		
28.....Inside the outer, protective covering there are sperm cells . *****	ANTHERIDIUM STRUCTURE Focus on a single antheridium. Move around to show external structure. Remove wall to show sperm cells to the inside.	cross at 01:18:42:00 to 01:18:54:00 01:18:57 to 01:18:54:00 01:18:57	
29. At the other end of the plant there are egg cases.	ANTHERIDIA CLOSE TO THE NOTCH Underside of prothallus, moving to anterior end of prothallus. View of notch with many archegonia hanging down.		
30. Each has a protective jacket. Inside, there is an egg cell .	ARCHEGONIUM STRUCTURE Focus on a single archegonium. Show the exterior with only the neck protruding. Move inside the neck to show the neck canal , then show egg cell [cut venter bit and go straight to the egg]	use cutaway to cover the neck cannel cell archcells FAM 01:19:55:00 01:20:10 Cross to 01:19:32:00 01:19:50:00	
31. These plants may form both sperm and eggs, but not at the same time, therefore avoiding self-fertilisation.	NURSERY: SINGLE PROTHALLUS Close up of isolated prothallus with finger. <u>Reel 5a 05:34 to 06:11</u> (will have to select a portion of this.	LJ005 05:05:56:03 05:06:07:17	
32. Being close to the soil, the tiny plants are easily flooded when it rains.	NURSERY: RAIN FALLING Rain falling on a group of prothalli. <u>Reel 5a 31:19 to 31:40</u>	LJ005 05:31:24:19 05:31:32:21	
33. This water plays an important role in fertilisation. ***	MODEL: PROTHALLUS FROM ABOVE Bisexual and male plants; camera then goes down and into water film.	FAM 01:09:55:00 01:10:22:00	

34. The sperm cases now opens releasing the sperm cells.	ANTHERIDIUM OPENING Cap cell comes off Sperm emerge.		
35. By beating their flagella , the sperm are able to swim freely in the surrounding water.	GROUP OF PROTHALLI FROM ABOVE Sperm trafficking between plants.		
	REPEAT OF (34) ABOVE: RELEASE OF BABY SPERM	insert hatching FAM 01:10:10:00 01:10:13:00 cut to 01:10:22:00- 01:10:33:00	
36. Each sperm is a spiral shaped cell with numerous flagella that move it forward.	DETAIL OF SWIMMING SPERM Multiflagellate sperm swimming across field of view	chop part of shot FAM 01:10:49:00- 01:11:40:00	
37. The water also stimulates the egg cases to open.	ARCHEGONIUM OPENING Rain or water film wetting the notch area of the prothallus. Cells at tip of archegonium peeling backwards on themselves.		
38. A chemical is then released into the surrounding water.....	DIFFUSION OF SPERM ATTRACTANT Spread outwards of attractant from archegonium mouth.		
39.where it stimulates the sperm to swim towards the open egg case.	ATTRACTING SPERM Sperm coming from adjacent prothallus Sperm coming from same prothallus Sperm being 'caught' by attractant field. Sperm swimming towards mouth of an archegonium		
40. Reaching the opening, a sperm makes its way toward the egg. (makes it's way)???	SPERM AT ENTRANCE TO THE NECK CANAL Sperm enter archegonium mouth and loosen their helix, being not so tightly coiled. Flagella still attached.		

	SPERM MOVING UP NECK CANAL Sperm wiggling their way up the neck canal		
	SPERM IN THE VENTER		
41. Fertilisation is completed when the sperm and egg nuclei fuse.	SPERM ENTER EGG CYTOPLASM Sperm enter egg cytoplasm. Flagella are now shed.		
	FUSION OF ONE SPERM WITH THE EGG NUCLEUS One sperm nucleus moves to and joins with, the egg nucleus.		

42. The role of this tiny plant is far from over as it now protects and nourishes the fertilised egg.	GREENHOUSE: Fern prothallus on soil, close up <u>Reel 5a 05:34 to 06:03</u>	LJ005 05:05:56:03 05:06:02:04	
43. The fertilised egg remains inside the egg case on the lower surface and begins to form an embryo.	ANIMATION: Fly in and cut away to reveal the Embryo growing on lower surface.	FAM 01:21:00:00 01:22:04:00	
44. The growing embryo gets nutrients from the surrounding tissue and enlarges.	NUTRIENTS GOING INTO EMBRYO Cut showing the nutrients going into the foot		
45. At first, the egg case around it stretches	VENTER STRETCHING external shot showing stretching of venter.		
46.but it eventually breaks.	VENTER BREAKING Venter ruptures and the root enters the soil (downward). (copy root of pine animation)		
47. A root now grows into the soil for support and to absorb water.	EMERGENCE OF ROOT Root growing out of venter.		
48. Other parts of the embryo form the first leaf and the future stem .	EMERGENCE OF LEAF, SHOOT Camera pans around to show leaf bursting out and then rhizome.		

<p>49. These grow and enlarge to form a small spore plant.</p>	<p>UNCURLING, EXPANSION OF LEAF leaf grows out and through the notch, bending upwards and expanding.</p>		
<p>50. In this way a new plant is formed.....</p>	<p>GREENHOUSE young sporophytes of progressively older ages. <u>Reel 5a 08:28</u> (very young nob) <u>Reel 5b 33:11</u> (1st expanded leaf; needs to be reversed) <u>Reel 6/7 08 42:50</u> (young fern from home)</p>	<p>LJ005 05:08:25:21 05:08:29:14 LJ005 05:33:53:21 05:33:56:21</p>	
<p>53.that will mature into another spore producing fern, continuing the reproductive cycle.</p>	<p>LOWER LECTURE THEATRE WALL Hound's tongue fern <u>Reel 2 03 29:04 to 29:14</u> (ground level, zoom in)</p>	<p>LJ002 04:18:51:10 04:18:57:14</p>	
<p>54. Ferns, then, are successful at reproducing themselves, using spores , sperm and eggs. This has enabled these attractive plants to spread throughout the world.</p>	<p>CAMPUS Hounds tongue ? ??Change to: Reel 2 04:04 (pull back from frond to scene off of bridge) CHANGE: REEL 2 04:04</p>	<p>LJ002 04:18:52:17 04:18:57:16 LJ005 05:01:59:15 05:02:04:06 LJ003 03:21:41:00 03:21:45:13 LJ002 04:07:08:05 04:07:12:14</p>	
<p>Closing Credits</p>			