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## IMAGE GALLERY

# Ant Ballet: Phase I

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The Ant Ballet project aims to create a precisely choreographed movement from a colony of ants through the use of artificial pheromones. This article presents an annotated storyboard of the film that documents the first set of experiments within the project. The full film can be viewed online at [www.antballet.org](http://www.antballet.org).

Most ants use pheromones – a form of chemical signalling – to communicate. These pheromones are specific to each ant species, and can carry a variety of messages, such as alarms, sex signals, or the location of food sources. To signal the location of food to other ants, a foraging ant often ‘dances’ whilst she is walking along, tapping her<sup>1</sup> abdomen on the floor to release a trail of pheromones. If other ants follow this trail and find food, they may also ‘dance,’ tapping their abdomens to release pheromones, thus reinforcing the trail. The increased density of pheromones causes any ant encountering the trail to be far more likely to follow it. Over time, through incremental changes in ant behaviour, the trail will optimise to form a highly efficient path. Once the food source has been depleted, the trail will fade away.<sup>2</sup>

Modern science now enables us to artificially synthesise certain pheromones. Ant Ballet works with a specific trail pheromone known as Z9:16 Ald, which is used by the Argentine ant *Linepithema humile*.

Working with UCL Organic Chemistry, Z9:16 Ald was synthesised and then bonded to a silica powder. This silica powder was then taken to Barcelona along with the Ant Ballet machine, where a colony of ants were placed on the surface of the machine. During the night, while the ants slept, the machine would spread artificial pheromone trails. When the ants awoke in the morning and started to forage for food, they would encounter the artificial trails and follow them, little realising that they were performing a choreography dictated by a machine.

Since the goal of choreographing ants with a high degree of precision is absurd and technically challenging, the process was broken down into four phases. What is seen here is the first phase: a technical test to prove that ants can be coerced into following artificial powdered pheromone trails. The test was performed and filmed in Barcelona in July 2011, and combines documentation of live experimentation with a theatrical fetishisation of machinery and scientific process. In other words, the project depicts real science through a deliberately elaborate, absurd machine.

## Notes

- <sup>1</sup> Foraging ants are almost always female.
- <sup>2</sup> For a more in-depth overview of ant colony optimization, see M. Dorigo, M. Birattari, and T. Stutzle, “Ant Colony Optimization,” *IEEE Computational Intelligence Magazine* 1, no. 4 (November 2006): 28–39, DOI: <http://dx.doi.org/10.1109/MCI.2006.329691>.

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**Fig 1:** SHOT 001. Panning shot of the protagonist observing the city of Barcelona from a high vantage point. Soundtrack of heavy breathing.



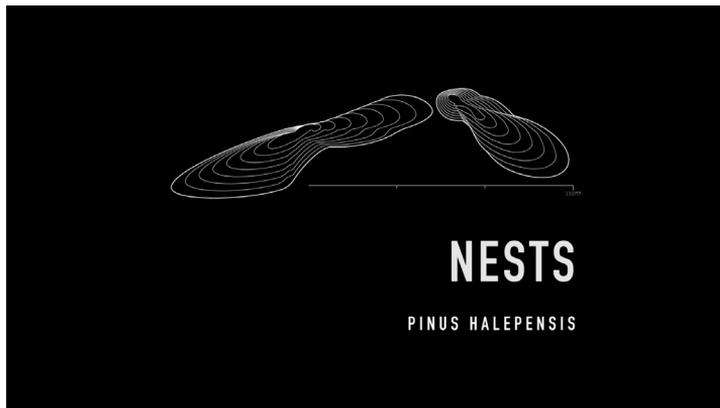
**Fig 2:** TITLE 001. Wide spaced sans-serif typeface flickers onto screen accompanied by the sound of static (taken from recordings of the servo-motors in the machine).



**Fig 3:** SHOT 100. Smooth dolly shot revealing Ant Ballet Machine, fly-through the forest. This shot took 4 days to achieve and nearly destroyed 3 cameras. The final rig consisted of 50 metres of climbing rope, a DeWalt drill motor and an innovative 'towel' braking system.



**Fig 4:** SHOTS 101-701. Two scientists prepare the Ant Ballet Machine for its performance. Scientist left prepares, whilst scientist right acts as assistant. The design for the light and large circular table is also modelled on Ken Adams' designs for *Dr. Strangelove, Or How I Learned to Stop Worrying and Love the Bomb* (dir. Stanley Kubrik, 1964).



**Fig 5:** TITLE 002. Giving the ants nests to live on was essential to ensuring they settled and would perform as predicted.



**Fig 6:** SHOT 203. All 'presentation' shots based on Comic Noir layouts. Consist of tilt-zoom into object being presented, against a black background.



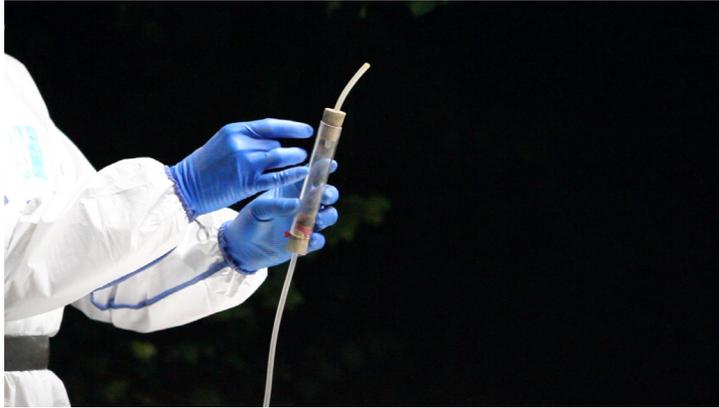
**Fig 7:** SHOT 204. Meticulous care was taken over the positioning of the pine chunks.



**Fig 8:** TITLE 003. *Linepithema humile*, or the Argentine ant, is one of the most invasive species in the world, and have thus far not invaded the United Kingdom. For this reason, the film was shot in a forest in La Floresta, Spain. The Argentine ants look similar to the native British species *Lasius niger*, but are around half the size.



**Fig 9:** SHOT 207. Sucking ants is a laborious and foul-tasting task. Unfortunately it is also the most efficient way to collect ants.



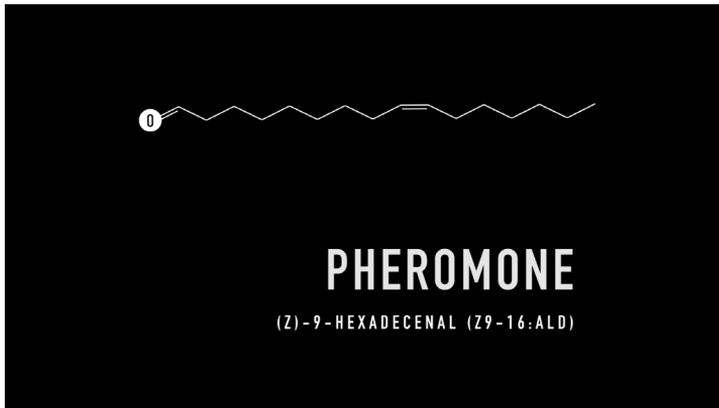
**Fig 10:** SHOT 209. Flicking tube full of ants to ensure they are not harmed whilst the top is loosened.



**Fig 11:** SHOT 213. Close-up of ants in tube against background of the machine surface. There are approximately 600 ants here.



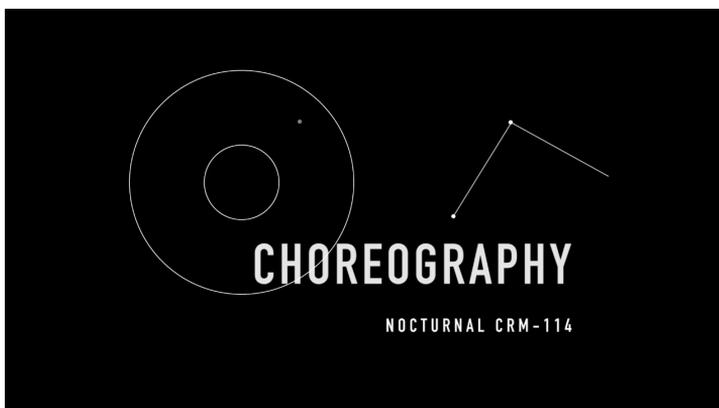
**Fig 12:** SHOT 214. Ants released onto the table, and into their new nest. It is essential to 'settle' ants in nests with a good amount of brood, or they will have no desire to follow artificial pheromone trails. Settling can take 12-48 hours.



**Fig 13:** TITLE 004. Pheromone title. (Z)-9-hexadecenal is the Argentine ant trail pheromone. It was kindly synthesised by UCL Organic Chemistry.



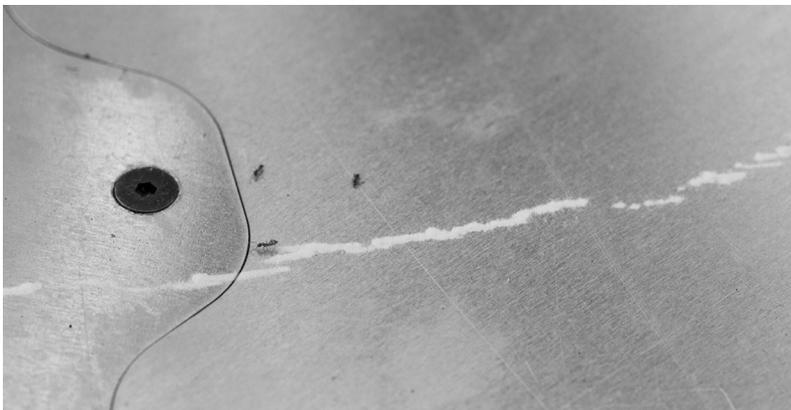
**Fig 14:** SHOT 301. Presentation of pheromone. The production of this film used 1g of pheromone absorbed in 1.4kg of silica powder.



**Fig 15:** TITLE 005. Infographics flicker onto screen in order of information hierarchy. The infographics are modelled closely on the HAL interface from 2001: A Space Odyssey (dir. Stanley Kubrik, 1968), following research at the Kubrick Archive, LCC.



**Fig 16:** SHOT 402. Ant Ballet machine spreading artificial pheromone. The machine operated throughout the night, creating trails based on pre-choreographed algorithms.



**Fig 17:** SHOT 603. (Close up) Ants awaking in the morning to find and follow an artificial pheromone trail in the hope that it will result in food. This is the first time that powdered pheromones have been used with Argentine ants in this way. The film can be viewed in full at [www.antballet.org](http://www.antballet.org).

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