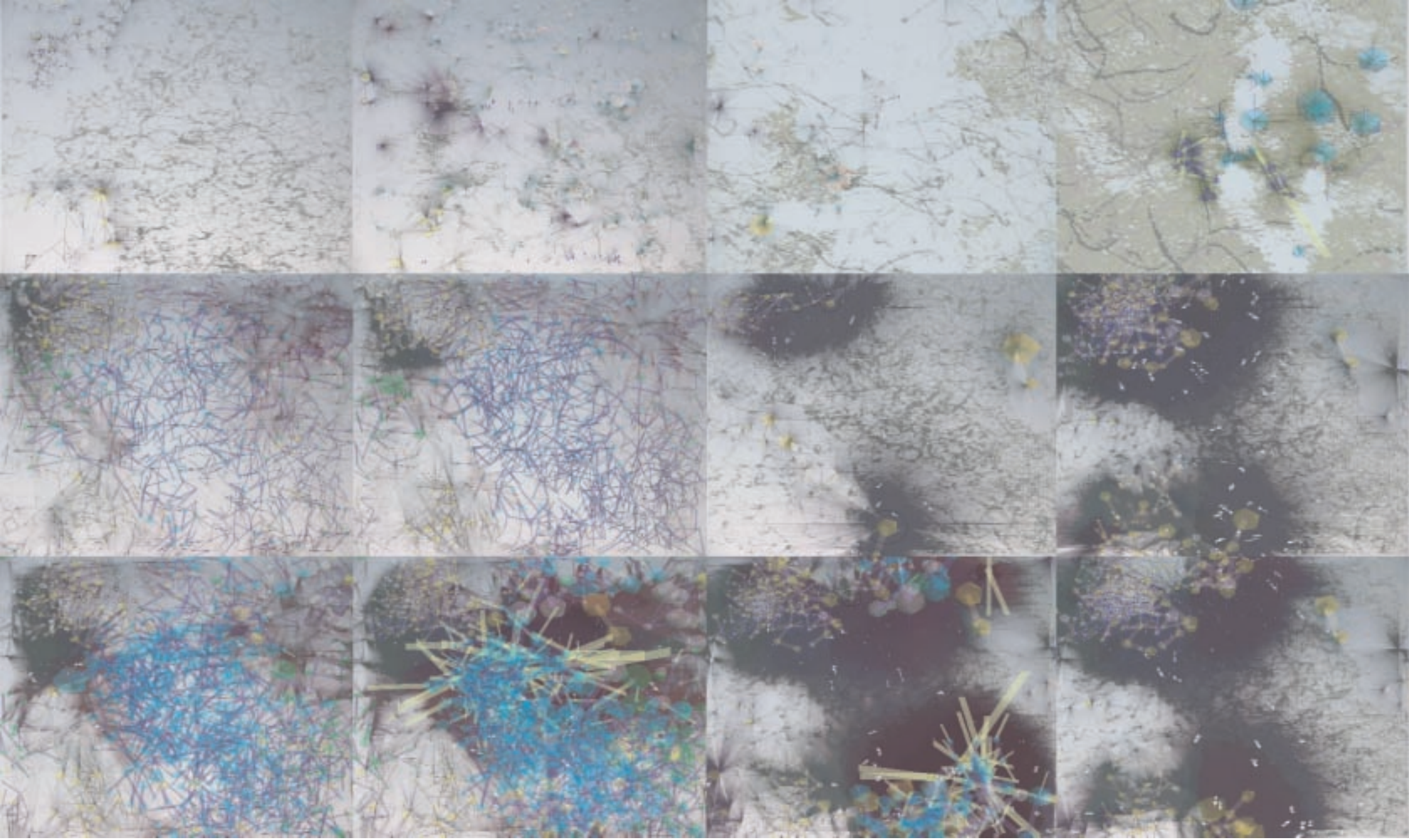
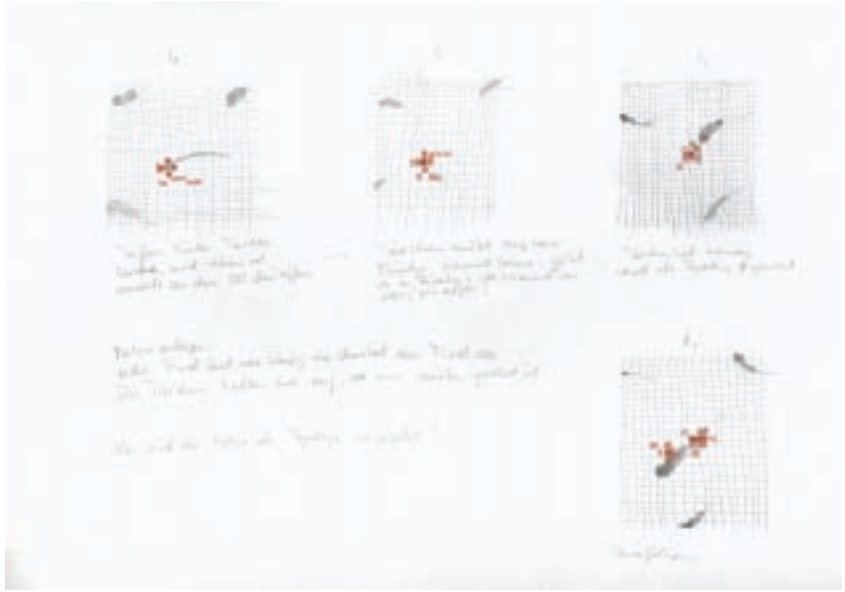
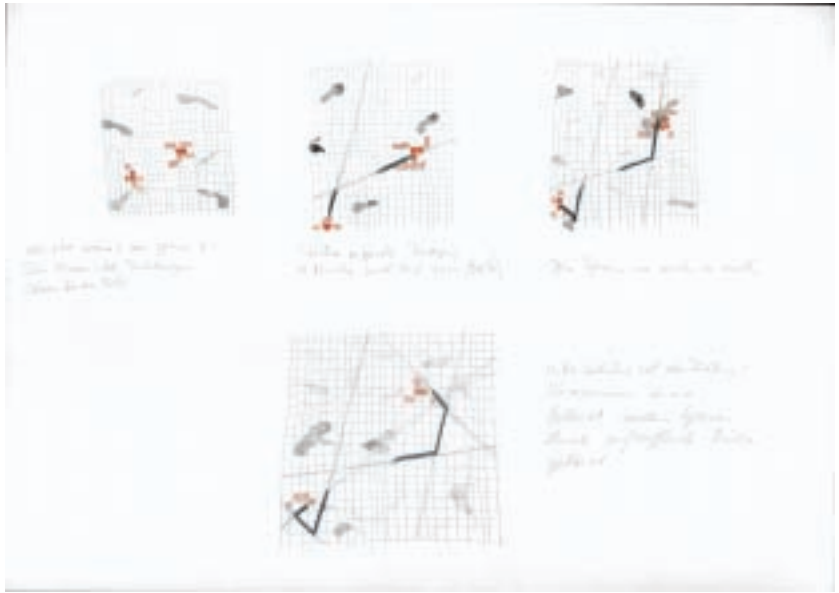


double helix swing an installation for swarms of midges on the banks of lakes and other bodies of water

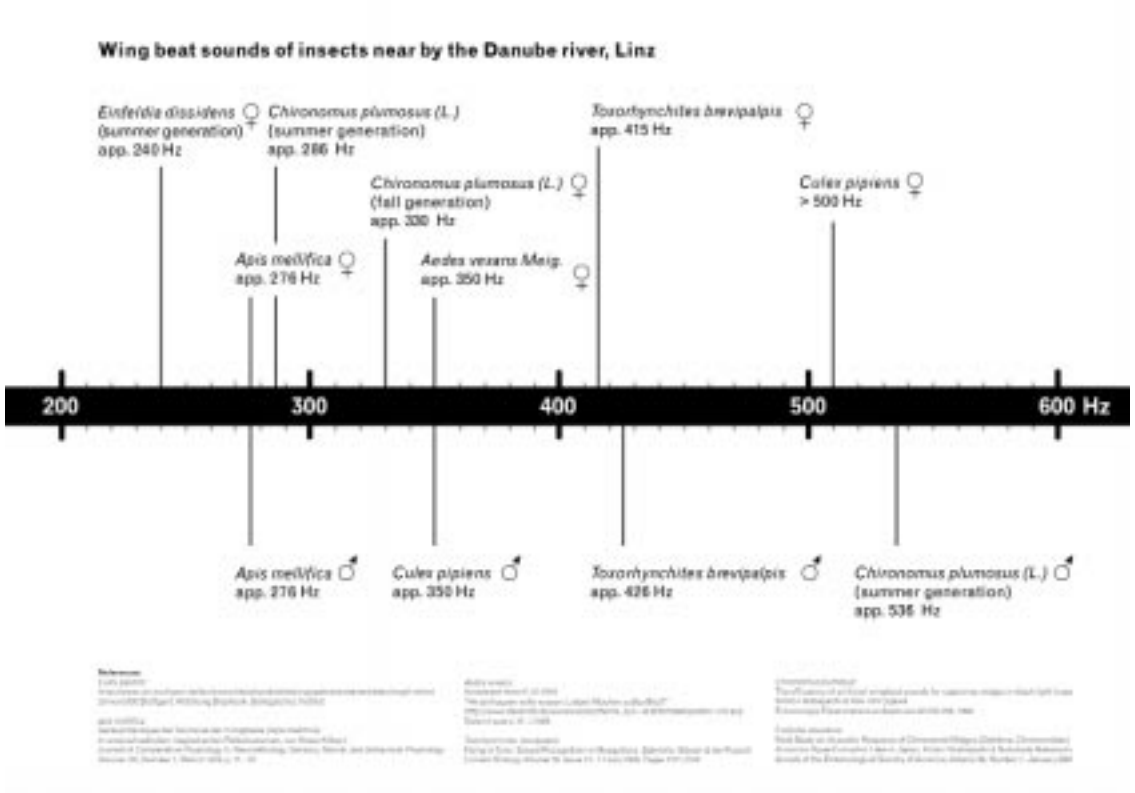




the idea

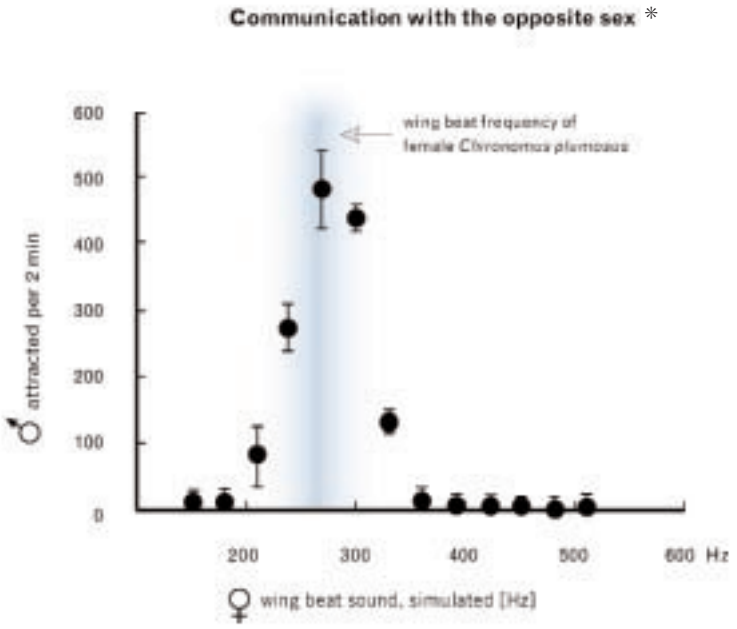
oben: outlines of the software
crayon on paper, 20 x 30 cm

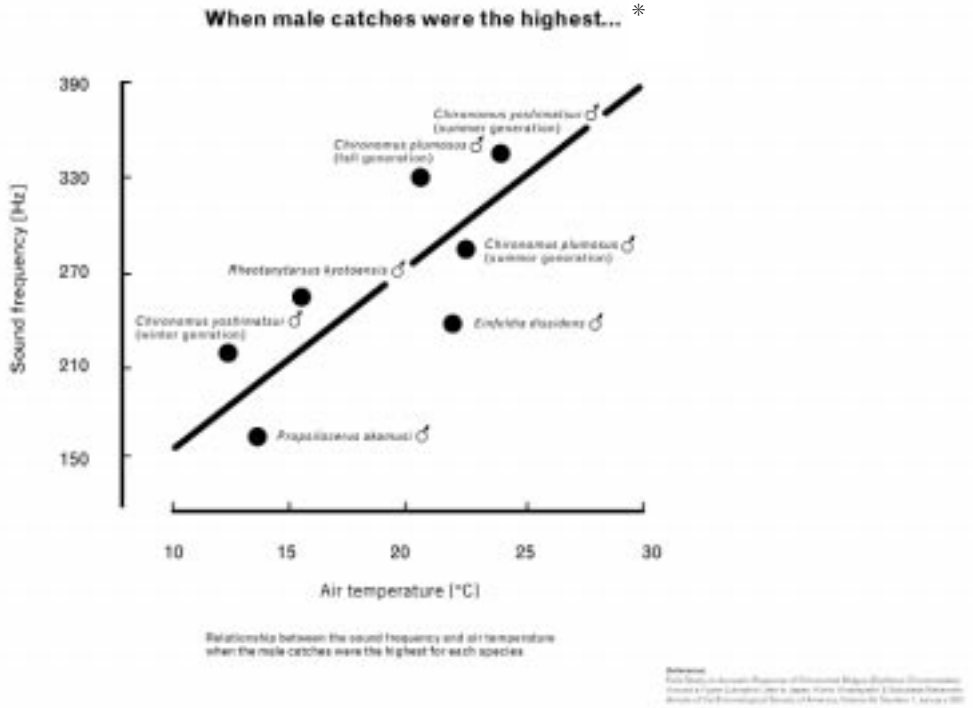
double helix swing is an installation which investigates the swarms of midges that can be found on the banks of lakes and other bodies of water. Swarms of midges are intriguing entities: without any apparent logic they form at irregular intervals along the bank: towers of midges flying in circles - although it seems that their flight path is in fact angular. It is as though they fly in one direction, then they suddenly stop and fly off in another. Each swarm develops its own speed and rhythm. And each swarm forms itself into an axis which is circled by the midges in both directions: a flying double-helix. The swarms are made up of male midges aiming to attract females for mating. Attraction and courtship occurs by wing beat which differs between the male and female insects.



above: Installation view at the O.K-Cetrum Linz at Ars electronica, 2006

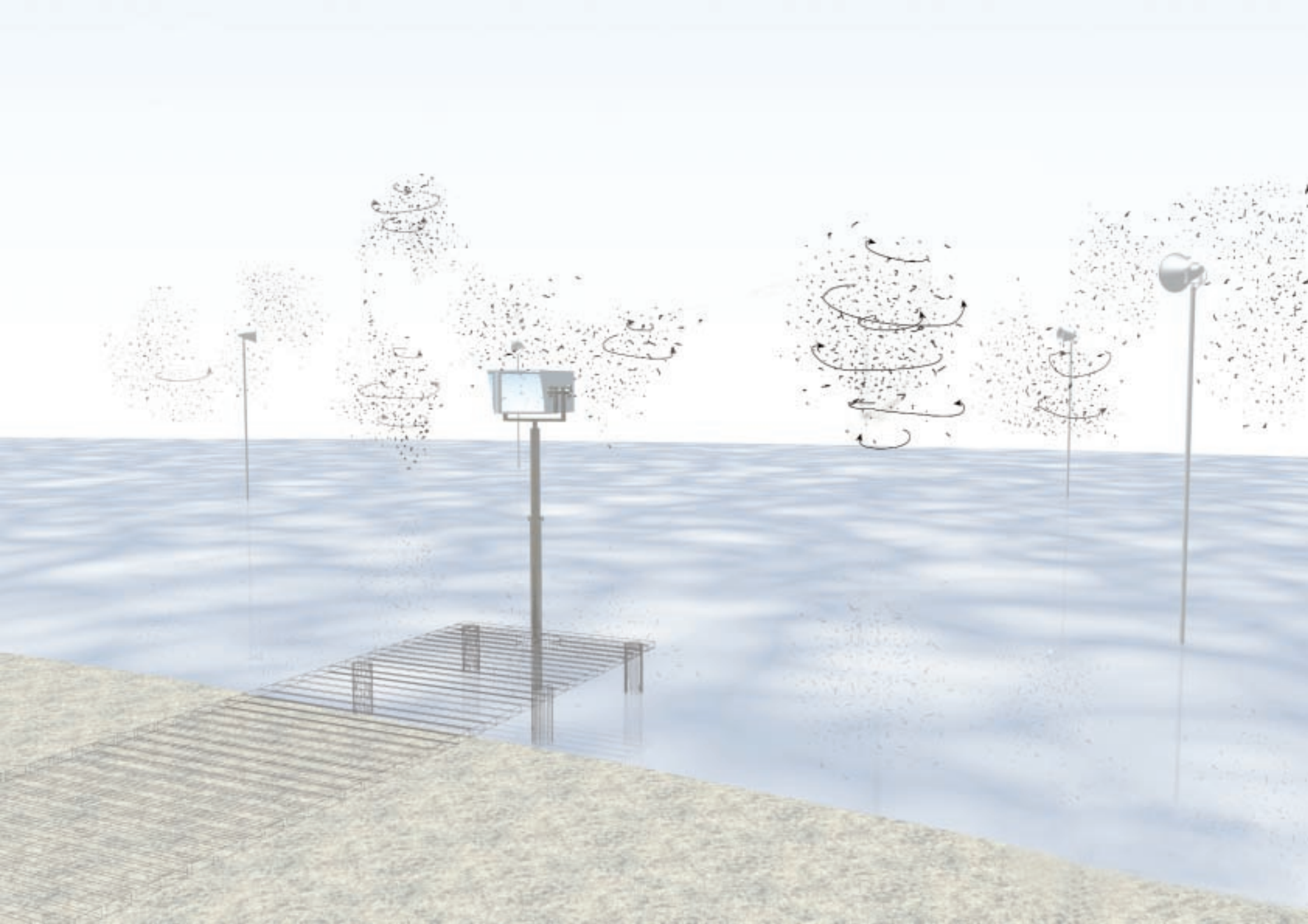
right: wing beat sounds at the Danube river, Linz digital print, 60 x 40 cm





* *Kimio Hirabayashi and Nobutada Nakamoto: Field Study on Acoustic Response of Chironomid Midges (Diptera: Chironomidae) Around a Hyper-Eutrophic Lake in Japan Annals of the Entomological Society of America Volume 94, Number 1, January 2001*

above: **charts about the effect of femal wing beat sound**
digitalprint, 60x40 cm
right: **outline of the outdoor installation**



the installation

loudspeaker with the wingbeat sound of female midges and other insects

camera for the recording of the videos

Based on the characteristics of attraction and courtship a video and sound installation is to be developed.

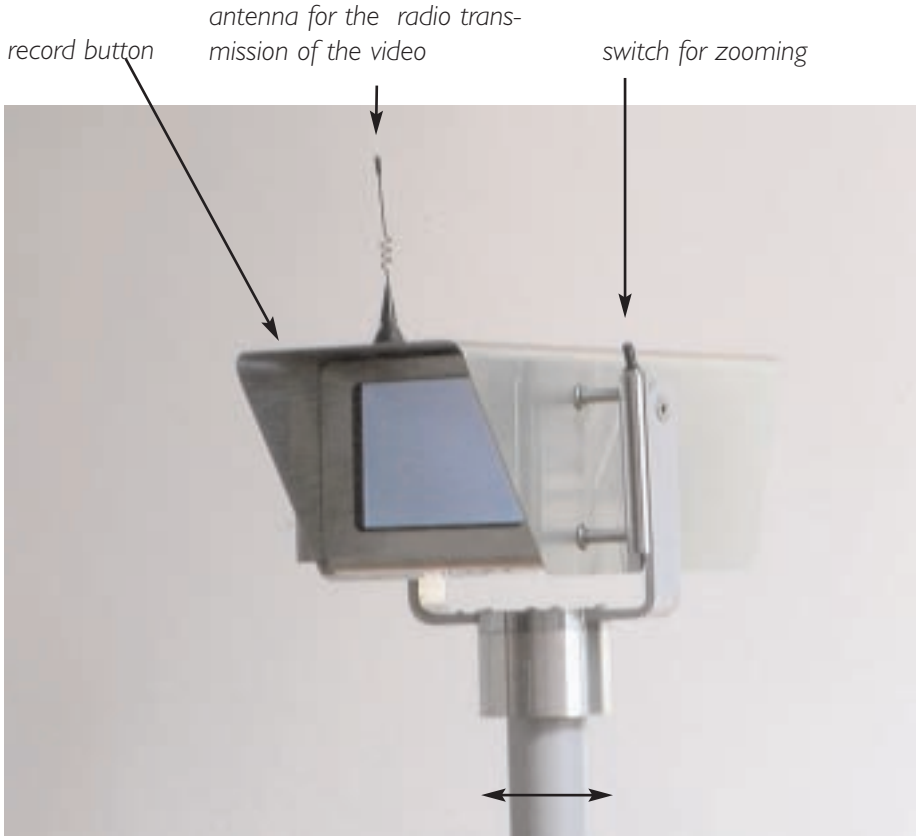
In order to observe the swarms they will be attracted by sounds of the female wing beat. Various sound sources (loud speakers) are distributed at intervals in shallow water. At a suitable distance from the sound source a video camera is located on the bank to record swarms which may form.

The camera is set up on a platform which can be accessed from the bank. Passers-by can approach the camera and look for the swarms in the viewfinder. The camera ist build to be used by passers-by, they can locate possible swarms by adjusting the camera (turning, zooming etc.). If the visitor detects a formation the camera remains still, a video image is recorded and is sent to a central computer. These videos are sent to a computer that analyses the movements and visualises them on the screen in the form of traces.

the swarm attractor

The loudspeakers around the camera emit the sounds of various insects' wing beats. Using the switch, passers-by can try attracting insects using the wing beat sounds of the females of different species.

Loudspeakers can be adjusted via the "swarm attractor" for different insects' wing beat sounds

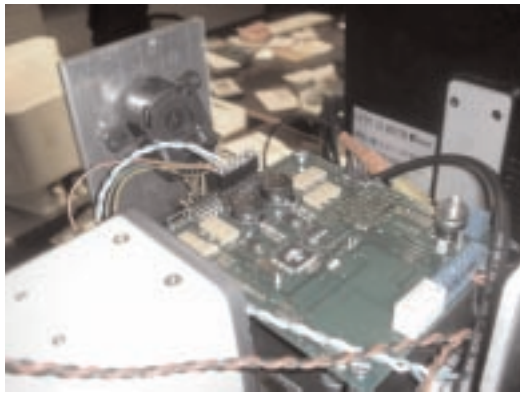


rotatability of the Camera (180°),
magnetic lock

Camera

above:
camera head with display and
operating elements

right:
programmable logic controller
camera complete

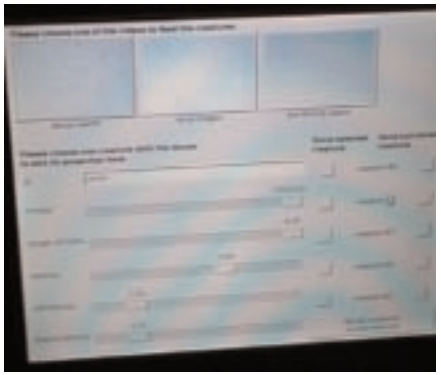



Record button, starts the transmission of the video signal and locks the recording of the camera head

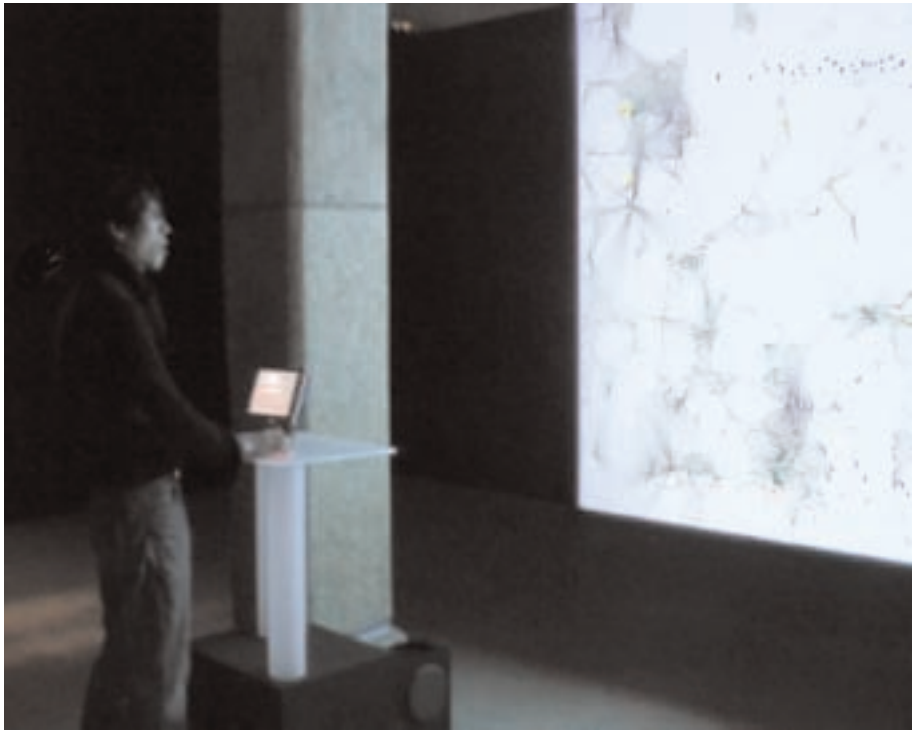
installation (indoor part)

A specially designed console provides different options for interacting with the virtual world.

Desk



Menue



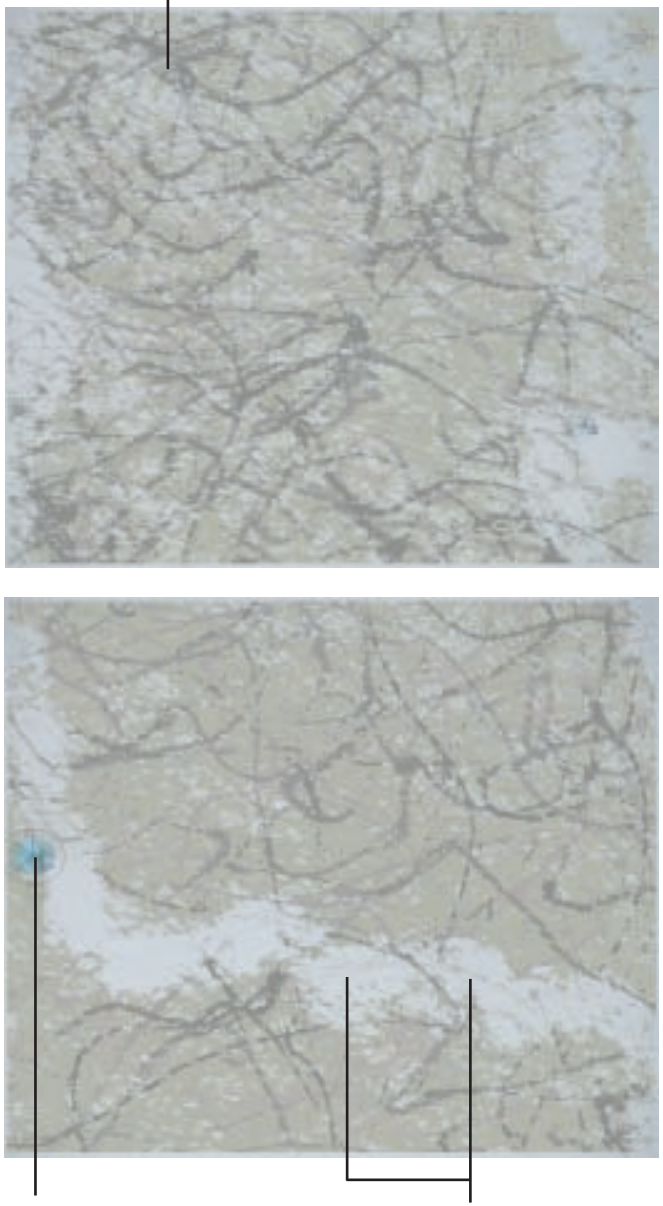
the software

The virtual world consists of three layers:

1. the video of the midges, which runs in the background.
2. the tracks of the midges, which are signified as nutrition (these are green tracks).
3. the virtual creatures searching for and eating the tracks of the midges

The creatures' survival depends primarily on the video, coming from the outdoor camera.

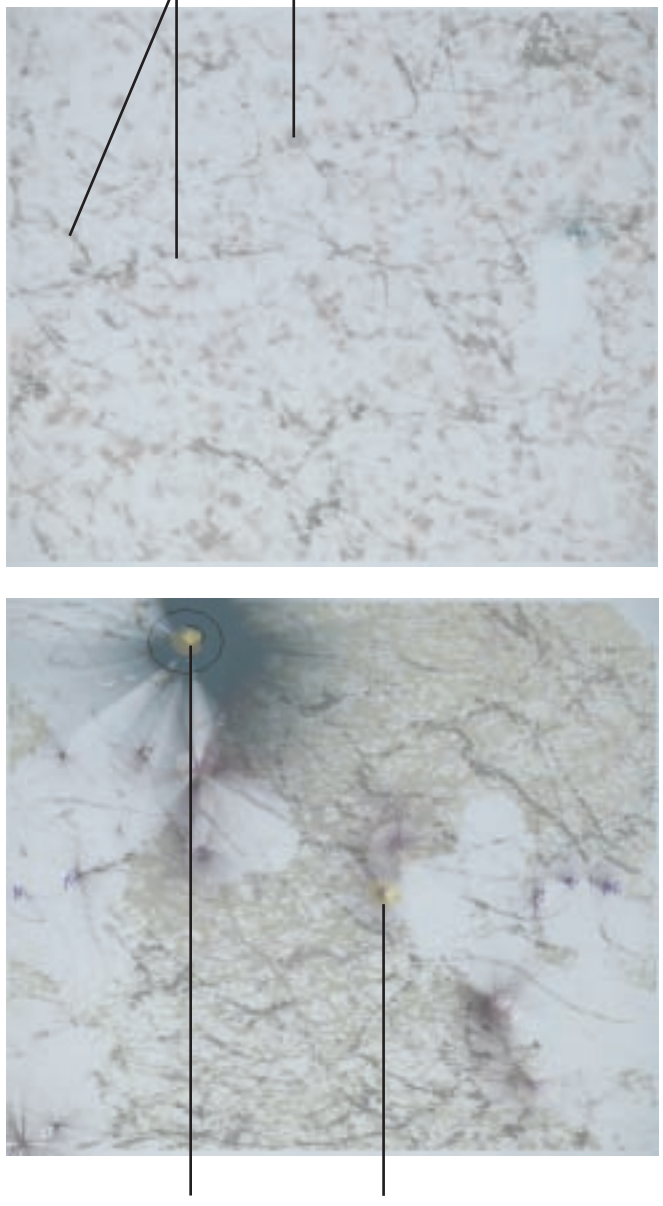
The form of the tracks generates a structure which serves as "food" to a number of virtual creatures. These virtual creatures are capable of evolving, so adapting better and better to the tracks generated by the movements of the real mosquitoes. The behaviour of the virtual creatures depends, therefore, on the real environment, but is also conditioned internally by a virtual "genetic code" of programming and behaviour. This code can in turn be manipulated by the user of the installation.



Traces from dense swarm

virtual creature, eating the traces of the midges

Flight paths of the midges (nutrition)



Traces of midges from a loose swarm and large midges

slow moving creature with large searching area (nutrition buffer)

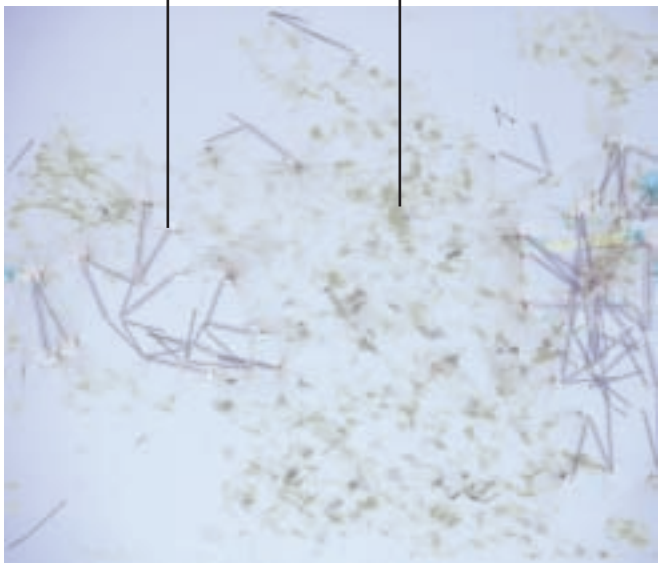
fast moving creature with small nutrition buffer

The intake of nutrition is regulated by a buffer, which stores all the food (that is the tracks) of the midges. The creatures have a variable food search radius. This radius depends on the velocity of the creatures. If they move fast, the search radius doesn't have to be so big as when they are more or less immobile.
The creatures never eat all the food at once. As they eat only a certain percentage of the food found, they are able to remember where nutrition is located.
The amount of food depends on the number of things moving on the video, coming from the camera.
Using the sound, a feedback loop is produced: if there is too much food on the screen, the sound from the loudspeakers is muted or just changed, so that the midges are no longer attracted.

The creatures develop different forms. Every animal has a virtual gene, which defines its movement and its form.
The form comprises the number of legs, the density of cells and the density of branches per node.
In the beginning there are three different types of creatures, but later on visitors can define new ones.
If a creatures is replicated, a random operation defines whether the animal will be changed or not. Then, another random operation partially changes the animal's code. While

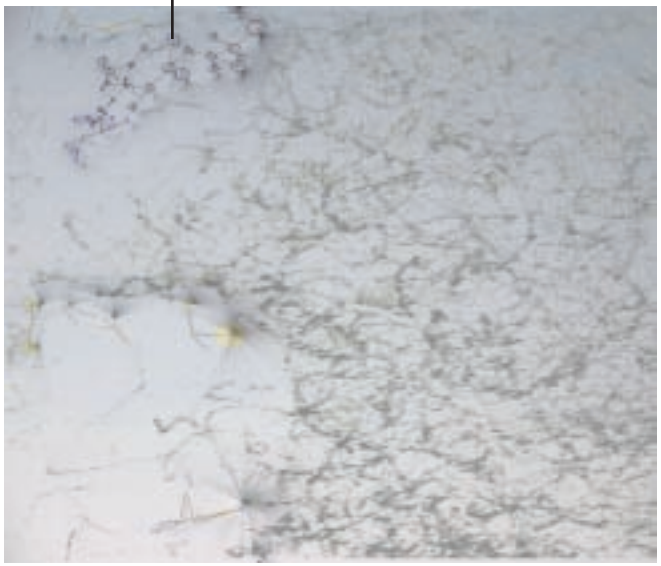
creatrues with long legs, fast moving

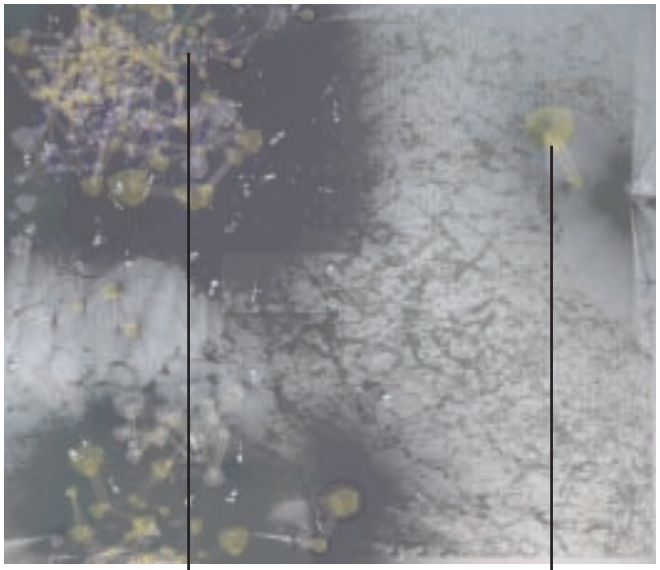
few midges, loose swarm



the creature is young, it will only have a few cells. But as it grows, it follows the form which is predefined in the gene.
It grows until a certain, adjustable energy level is reached. Then it gives birth to several new creatures.
If the creature becomes big, it is possible that the cells will pull in different directions. Then the creature breaks in two. Both parts survive, one of them with the original code, the other with the new small form gene.

old creature with mutations (many cells, many arms or legs)

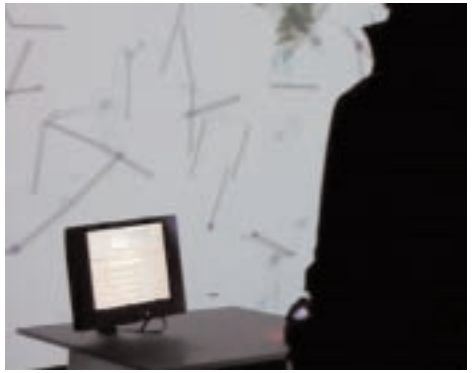


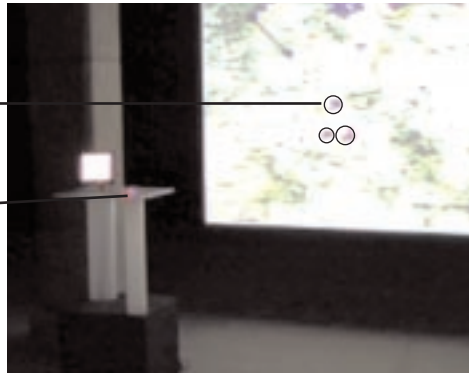


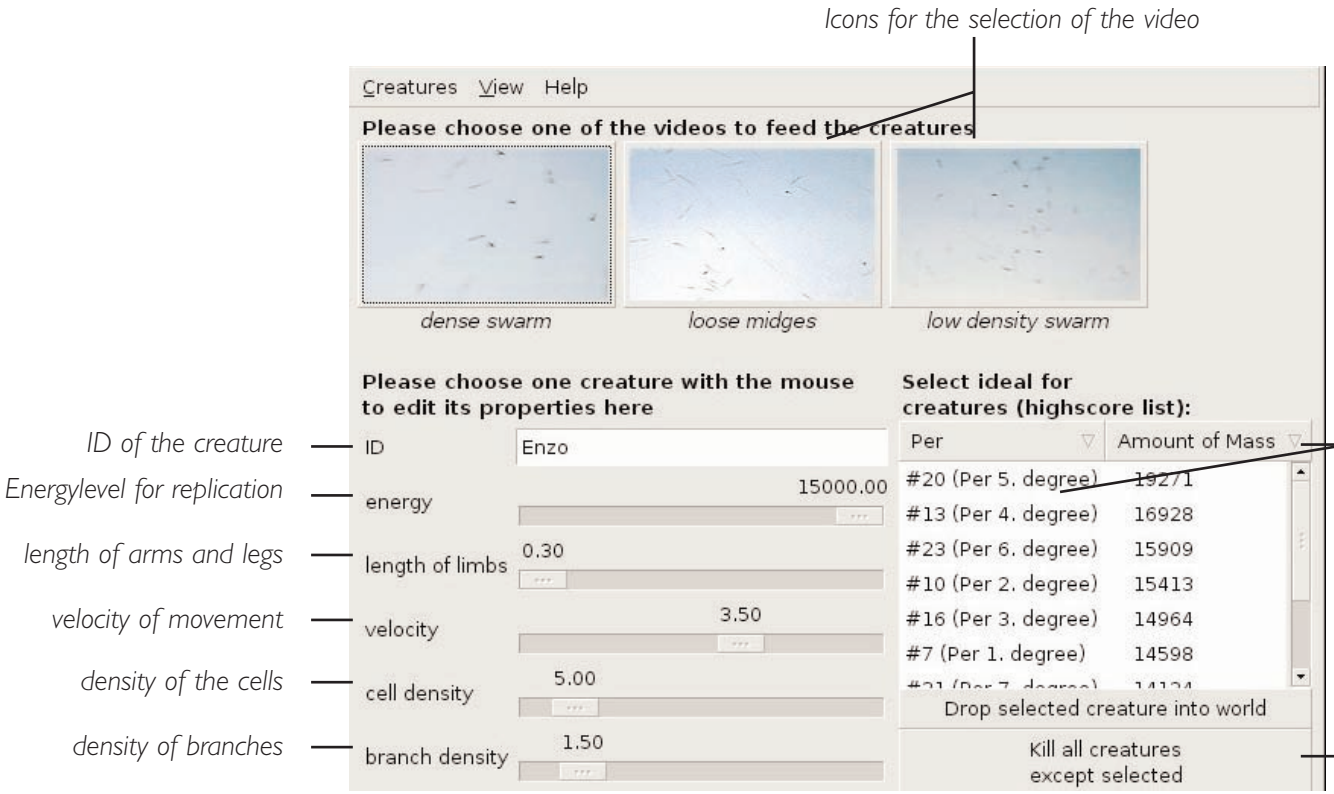
„explosion" of creatures in consequence of nutrition surplus

fast animal with small search radius

Installation view at the
Wallraf-Richartz-Museum Cologne, 2006




creature (with 3 cells)
selected with the mouse
mouse


Icons for the selection of the video
Creatures View Help
Please choose one of the videos to feed the creatures
dense swarm
loose midges
low density swarm
Please choose one creature with the mouse to edit its properties here
Select ideal for creatures (highscore list):
ID of the creature
ID
Enzo
Energylevel for replication
energy
15000.00
length of arms and legs
length of limbs
0.30
velocity of movement
velocity
3.50
density of the cells
cell density
5.00
density of branches
branch density
1.50
Per
Amount of Mass
#20 (Per 5. degree) 19271
#13 (Per 4. degree) 16928
#23 (Per 6. degree) 15909
#10 (Per 2. degree) 15413
#16 (Per 3. degree) 14964
#7 (Per 1. degree) 14598
Buttons to store and select creatures on the screen
Drop selected creature into world
Kill all creatures except selected
button for killing all creatures besides one

technique:

The installation can be shown as an indoor installation with or without the camera and the swarm attractor

The camera can be shown outdoor during summer closed to rivers or lakes. But it can also be shown indoor with videofootage on its screen together with the swarm attractor.

For the installation without the camera you need:

1 Linux-PC 3,2 GHz, 1 GB Ram, 3D-accelerated graphic card, , soundcard (has to be shiped)

1 stand (has to be shiped)

1 Video projector

2 Soundboxes (activ)

For the camera the following material is needed:
1 Linux-PC 3,2 GHz, approx. 1 GB Ram, mp2-encoder videocard
Multi-channel receiver

5 loudspeakers

Camera (special design, has to be shiped)

Swarm attractor

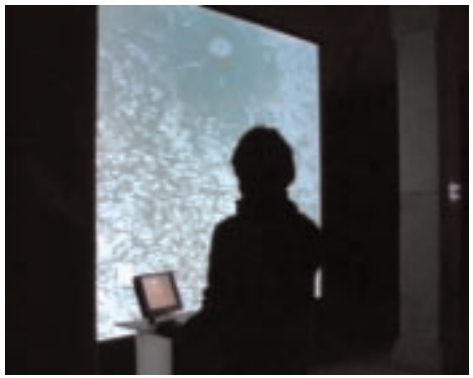
credits:

Concept: Ursula Damm

Programming: Christian Kessler

Sound: Yunchul Kim

Camera: Gwendolin Taube



view of the exhibition hall at Conde Duque, Jan. 2005