

Love.Leech.Tomato. A non-photorealistically rendered short film

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Introduction

A wealth of knowledge exists concerning non-photorealistic rendering (NPR) techniques to which the artistic community has limited access. A cooperation between researcher Thomas Luft, film-maker David Maas and the Filmakademie Baden-Württemberg sets out to bridge the divide between technical research and practical film-making. The result is *aquaTree*, a work-in-progress expressive rendering application focused on enabling animated 3d content of convincing coherent quality. The goal of the collaboration is both to allow artists access to NPR and to generate feedback with which to test and expand research theory. After presenting a paper on interactive watercolor techniques at last year's NPAR, Thomas Luft was contacted by David Maas who recognized the inherent artistic and production value that such an application would offer. This *expressive* renderer is both a straight-forward attempt to grant artists access to existing NPR techniques and an innovative approach to hybrid 2.5d visualization, interpreting 3d scenes within a metaphor of 2d compositing planes. An important aspect of the collaboration is to provide practical feedback to theoretical graphics research.

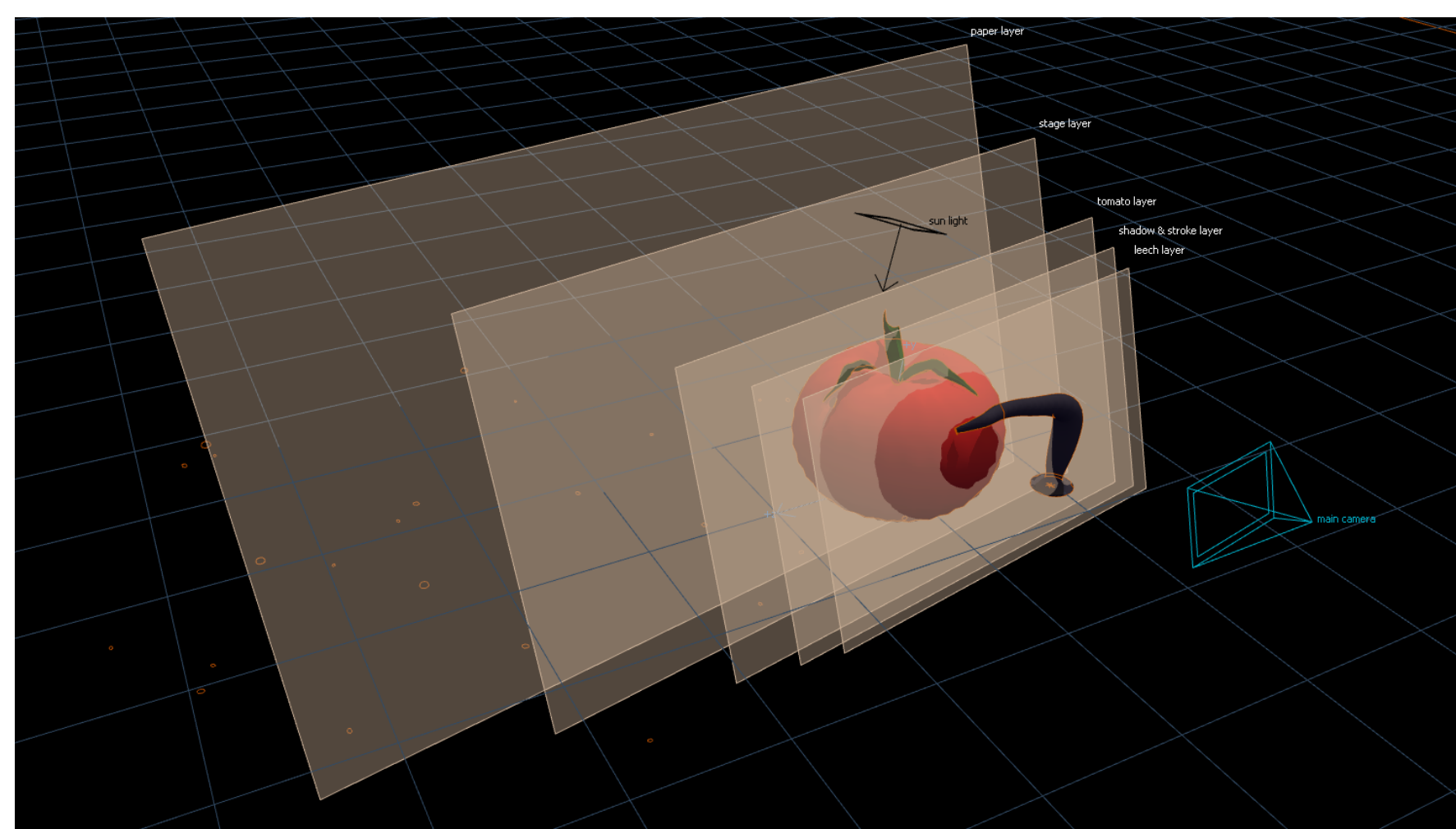


The Film

Love.Leech.Tomato — an encounter between a starving leech and a plump tomato takes turbulent and unexpected turns in this poetic 4 minute film. The symbolic abstraction of the give-and-take encounter between a leech and a tomato offered itself for this exploration, as our goal was to adress the expressive nature not just of the materials, but also of the represented forms and their haptic qualities — as experienced through deformation, transformation and interpretation, the accessibility of which is too often clouded by technically-demanding 3d rigging and animation processes and so remains associated with hand-drawn animation.

The Renderer

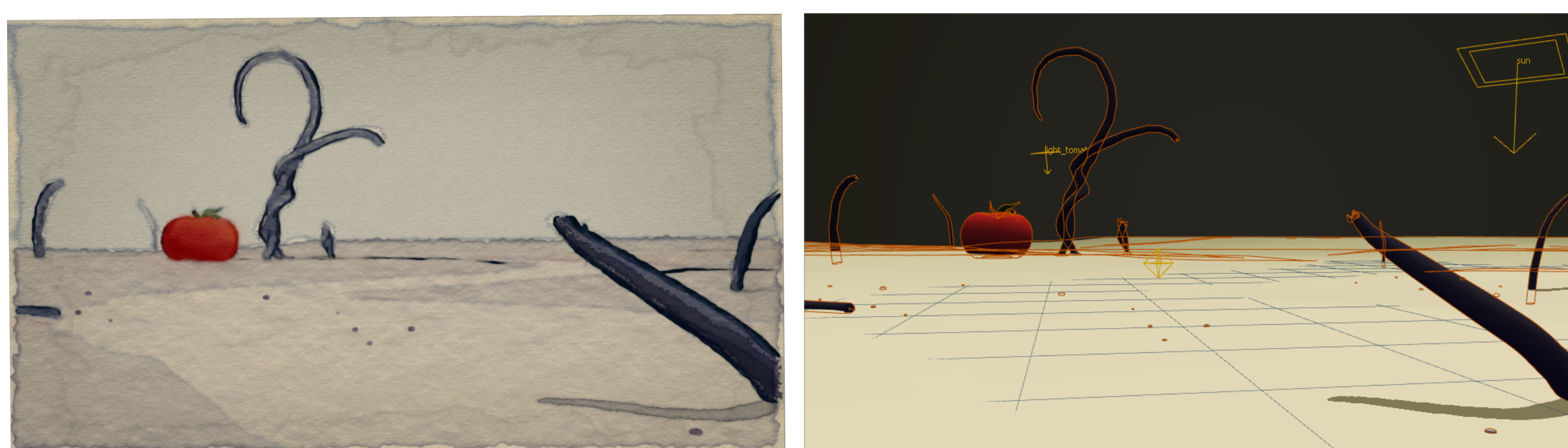
The core of *aquaTree* is organized as a 2.5d graphics solution: Resembling the natural drawing process and natural drawing media, a stack of semi-transparent layers is defined, each holding individual graphical elements and parts of the 3d scene. Hereby, a layer resembles a sheet of paper that is located within the 3d world and aligned to the viewer. Each layer is linked with scene objects that are represented in a certain artistic style. For stylistic diversity a stroke painter and a color painter is therefor provided, both producing coherent output. A composition of these layers forms the final rendering.



A 2.5d graphics solution based on layers forms the core of *aquaTree*.

The reduction of shower-door effects — a natural problem in NPR resulting from inconsistencies between scene and canvas movement — is realized on basis of this 2.5d solution: Canvas textures are tightened to a so-called anchor, which is defined for each layer individually. As a result, the canvas textures move and scale coherently in accordance to the rigid object movement and the camera movement. The anchors can be placed and animated for each layer independently providing a high flexibility.

The application provides two rendering modes: a preview mode using standard shading techniques, and a real-time non-photorealistic mode providing a full rendering and composition of the scene layers. For Love.Leech.Tomato. the render output was directly used without any additional editing.



aquaTree offers both a non-photorealistic mode and a standard shaded preview mode. Interactive feedback in the NPR mode can easily be achieved at typical screen resolutions. A high resolution output take some seconds per frame, e.g. a HD1080 rendering of this film takes about 6 sec. per frame on a GeForce7900GTX.

T. Luft, O. Deussen:

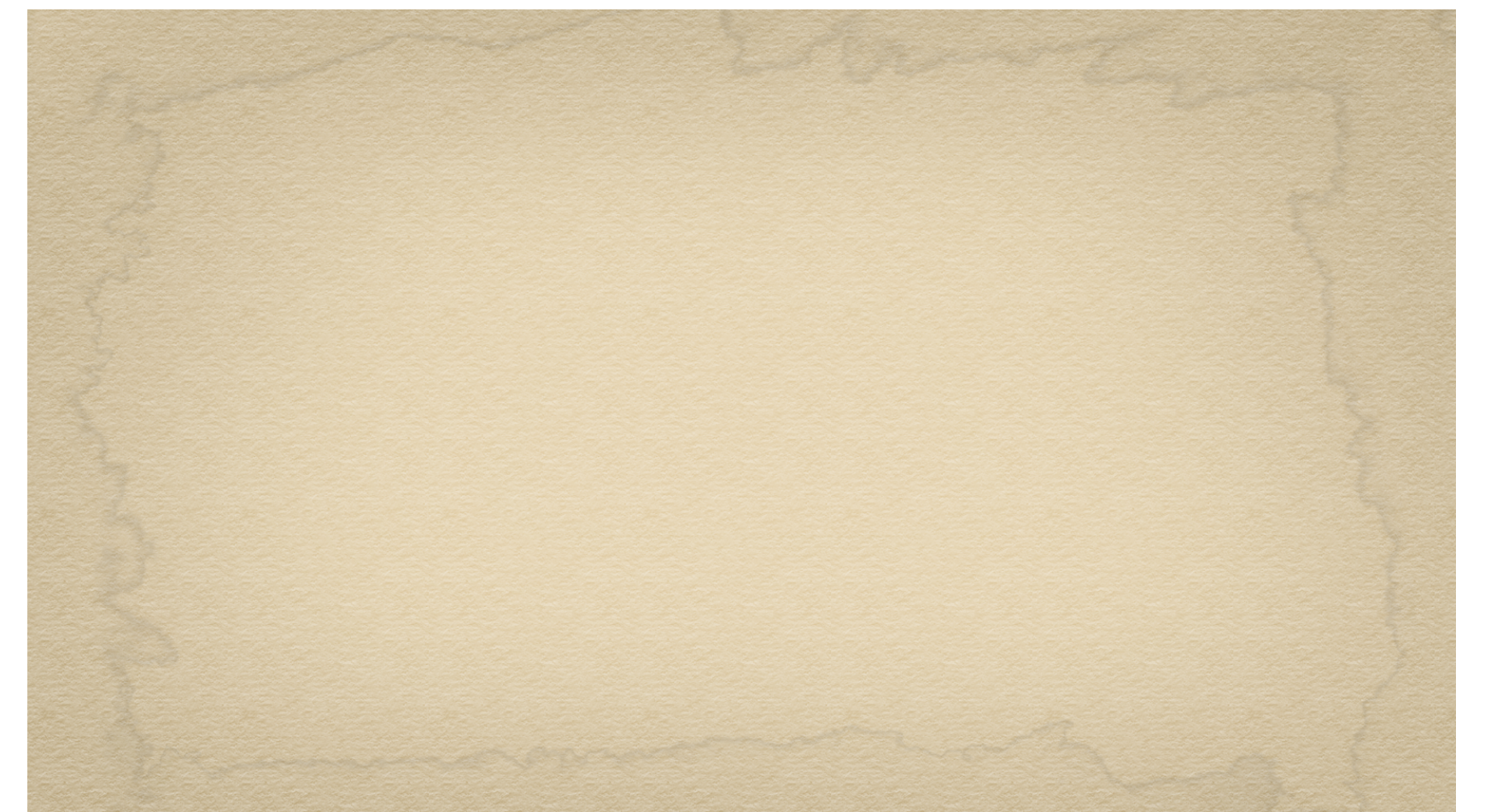
Real-Time Watercolor Illustrations of Plants Using a Blurred Depth Test

International Symposium on Non-Photorealistic Animation and Rendering (NPAR), 2006

T. Luft, C. Colditz, O. Deussen:

Image Enhancement by Unsharp Masking the Depth Buffer

International Conference on Computer Graphics and Interactive Techniques (SIGGRAPH), 2006



Starting with a static background layer as the paper...



...we add two color layers for the tomato,



...two additional layers for the leech,



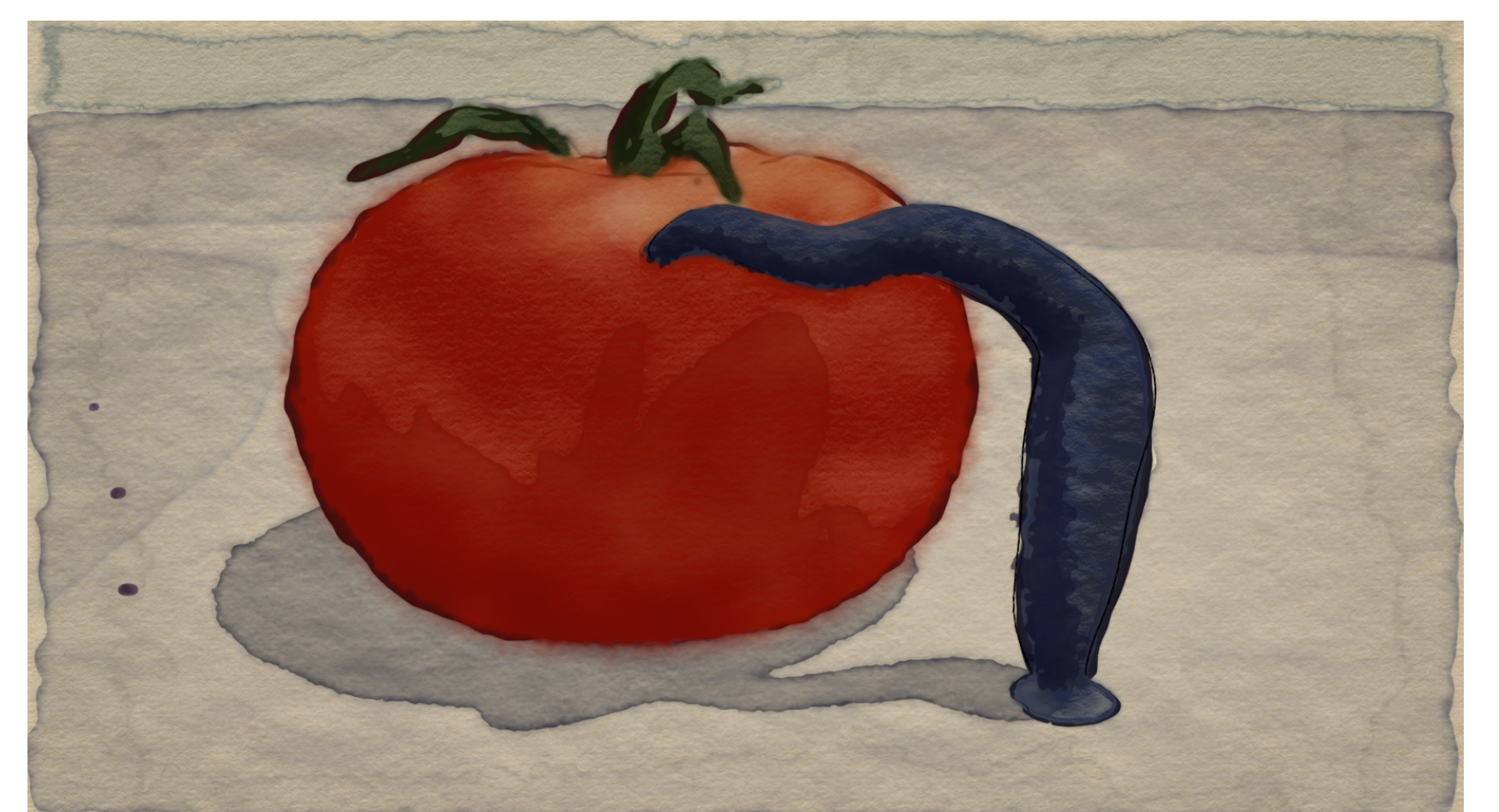
...two different shadow layers,



...another layer that contains the contour strokes,



...four color layers for the stage,



...and we get one frame of Love.Leech.Tomato. made of twelve individual layers that are composited on the screen. The rendering output is directly used without any additional editing.

