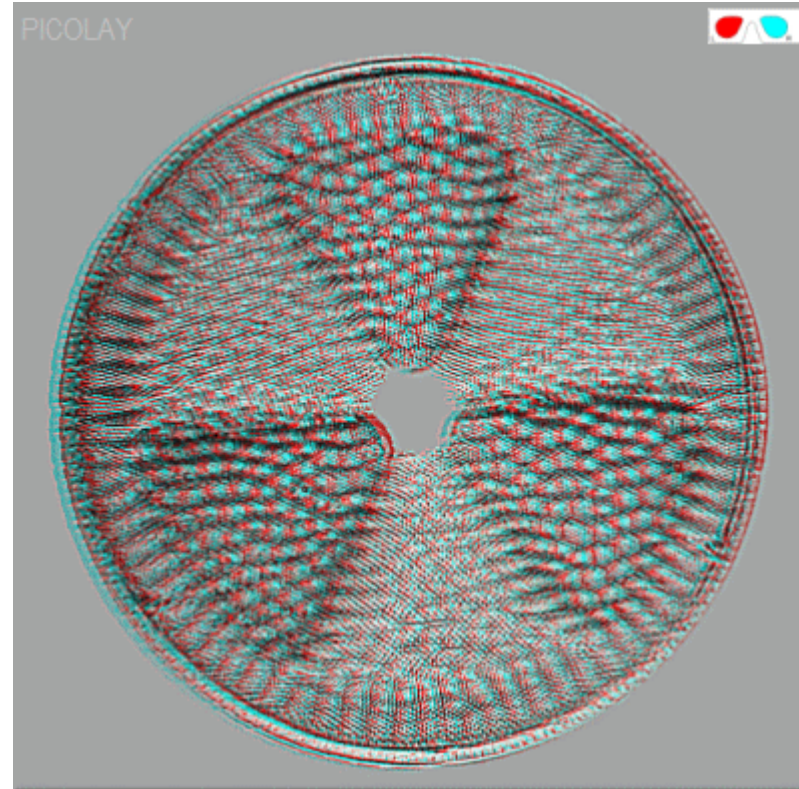


3D-Darstellung von Mikro- und Makro-Objekten mit PICOLAY



Heribert Cypionka

Institut für Chemie und Biologie des Meeres

Universität Oldenburg, Germany



Vortrag: Kornrade 10, Darmstadt 14.6.2013

www.pmbio.icbm.de

Themen

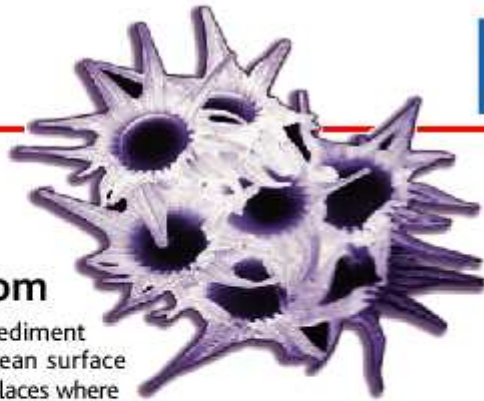
- **Motivation: Der Mikrobiologische Garten**
- **Weshalb gibt es PICOLAY nur auf Englisch?**
- **Bildbearbeitung mit PICOLAY**
- **Räumliche Projektion und 3D-Bilder**
- **(Wenig) Theorie und Praxis**

Mikrobiologischer Garten



(c) Heribert Cypionka 1 1 2 4 7 4

NETWATCH



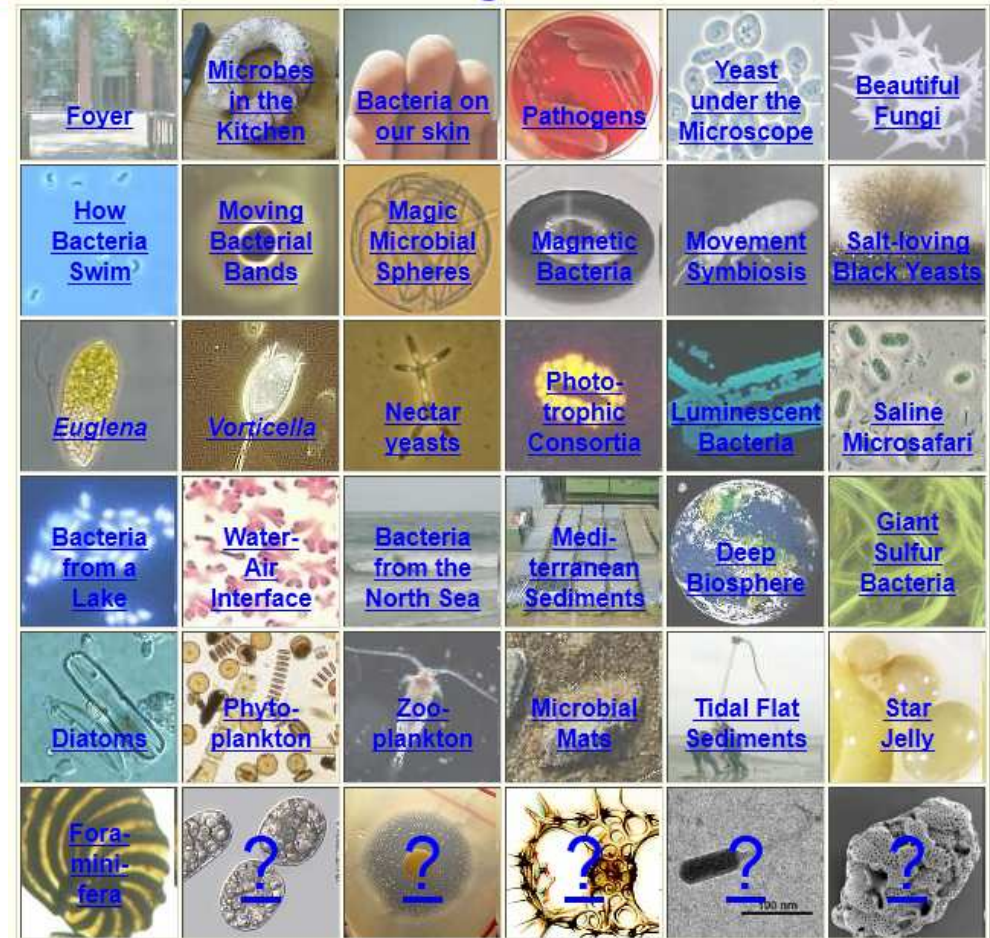
IMAGES

Microbes in Bloom

A briny desert lake and sediment 5000 meters below the ocean surface are just two of the unlikely places where microbes prosper. The Microbiological Garden, tended by Heribert Cypionka of the University of Oldenburg in Germany, shows off the bugs dwelling in these exotic environments and in habitats closer to home. The site features more than 20 photo essays on microbial topics. You can tag along on bug-hunting expeditions, learn how to isolate luminescent bacteria from herring, and observe the bugs that inhabit the scum on the surface of a stagnant pool. Some microbes make the gallery because of their beauty, such as these yeast spores (*Emericella stellamaris*; above) that resemble flowers.

www.microbiological-garden.net

www.sciencemag.org SCIENCE VOL 309 9 SEPTEMBER 2005



www.microbiological-garden.net

www.mikrobiologischer-garten.de



PICOLAY



by Heribert Cypionka

| [About](#) | [Manual](#) | [Tutorials](#) | [Deutsch](#) | [Galleries](#) | [What's new](#) |



- Focus stacking - slim and fast - stereo images from a single z-stack - image processing -
- slide shows - animated gif images etc. - portable freeware - no installation required -



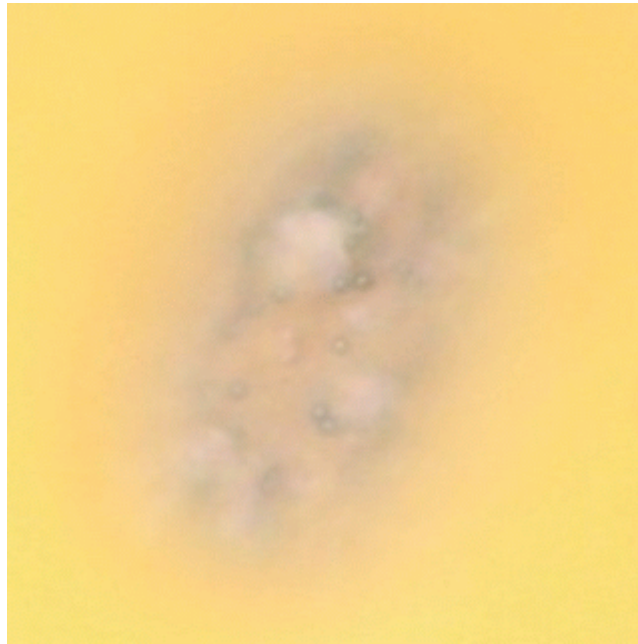
PICOLAY Galleries



- [Stacked images \(no 3D effect\)](#)
- [3D: Anaglyphs \(for red-cyan goggles\)](#)
- [3D: For crossed-eyes \(some for parallel eyes as well\)](#)
- [3D: Animations \(some as anaglyphs\)](#)
- [3D: MPO files \(for big 3D-TV screens\)](#)
- [Videoclip \(wmv format\) showing a full rotation of *Actinoptychus*](#)
- [Demonstration of the 3D capacities PICOLAY on a foraminifer](#)

PICOLAY - Unterstützung auf Deutsch

- [Schritt für Schritt \(DEUTSCH, ~~2012-05-11~~\) 24.5.2013](#)
- [Anleitung auf DEUTSCH \(2012-07-14\)](#)
- [Presentation \(pdf\) given at the IME meeting in Emden \(2010-09-08\)](#)
- [Tutorial auf DEUTSCH \(2010-09-09\)](#)
- [Bebildertes Wörterbuch Englisch-Deutsch \(2010-09-08\)](#)
- [Demo-Video \(21 MB, 2010-09-02\)](#)

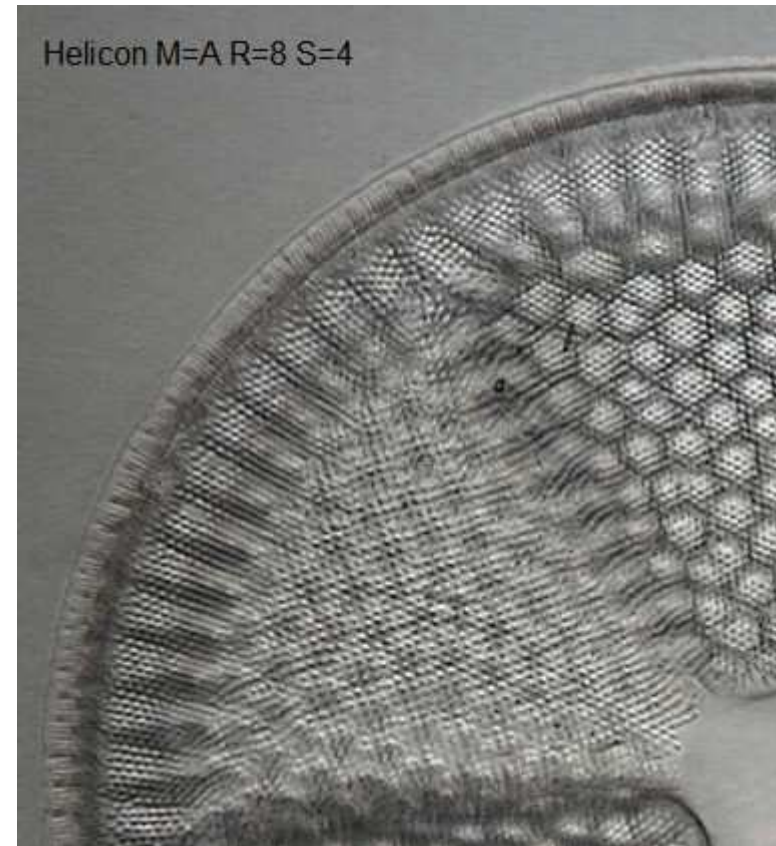
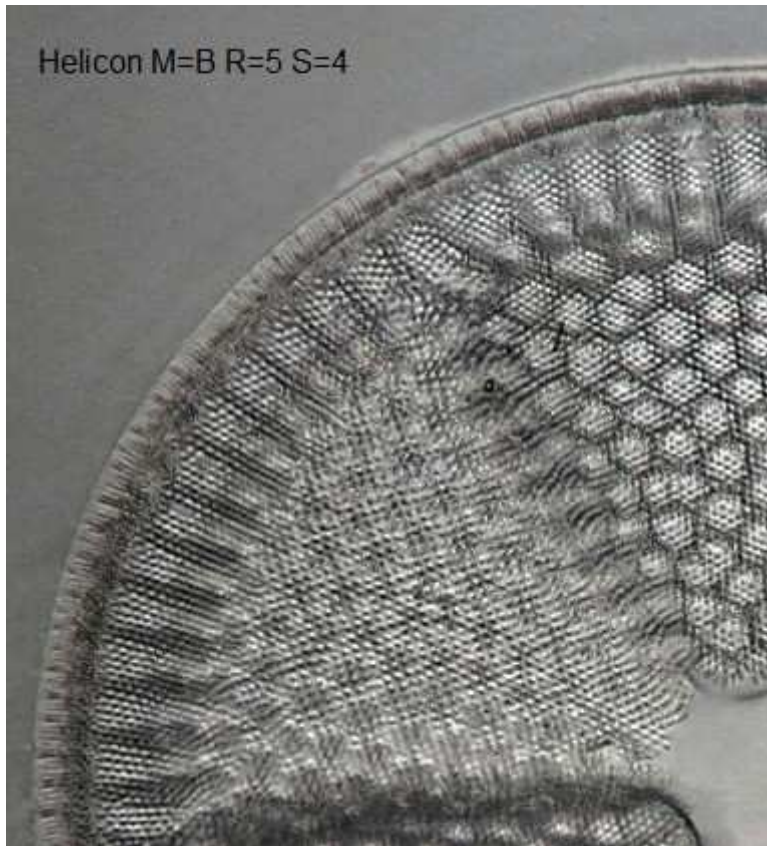


Achromatium oxaliferum

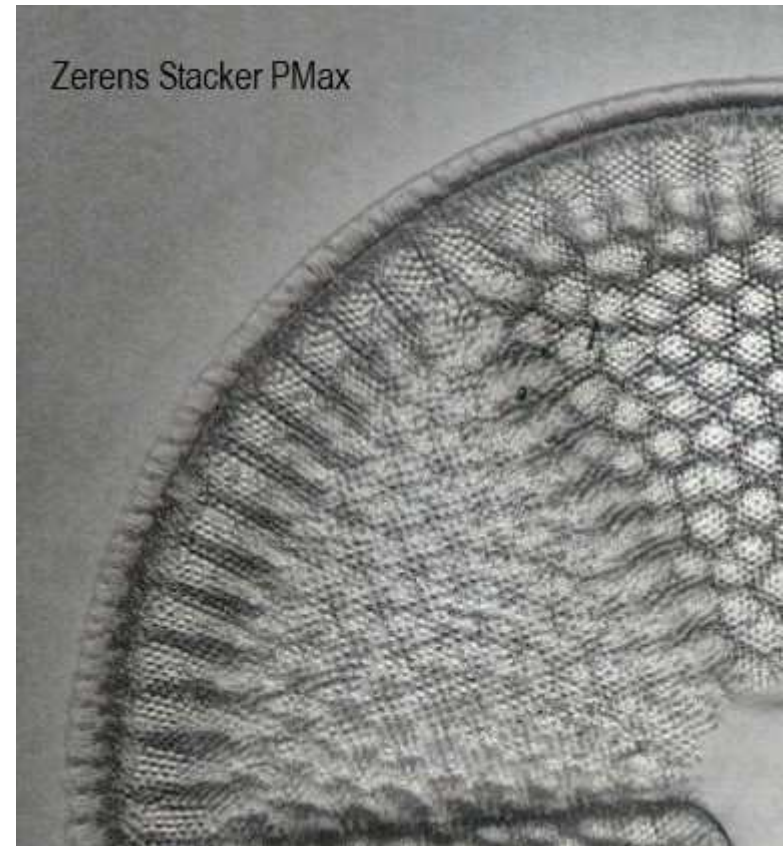
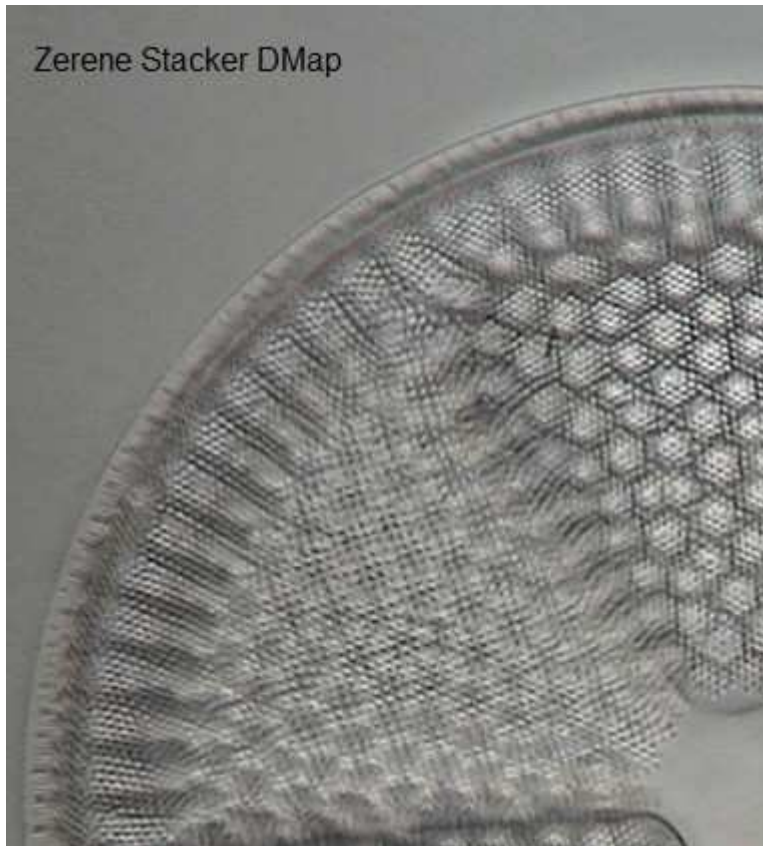
Stacking allein = digitales Bügeleisen



Stacking-Programme im Vergleich (1)

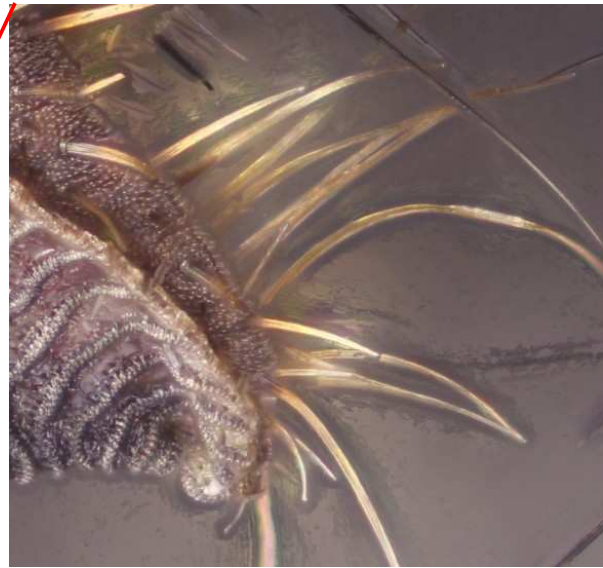
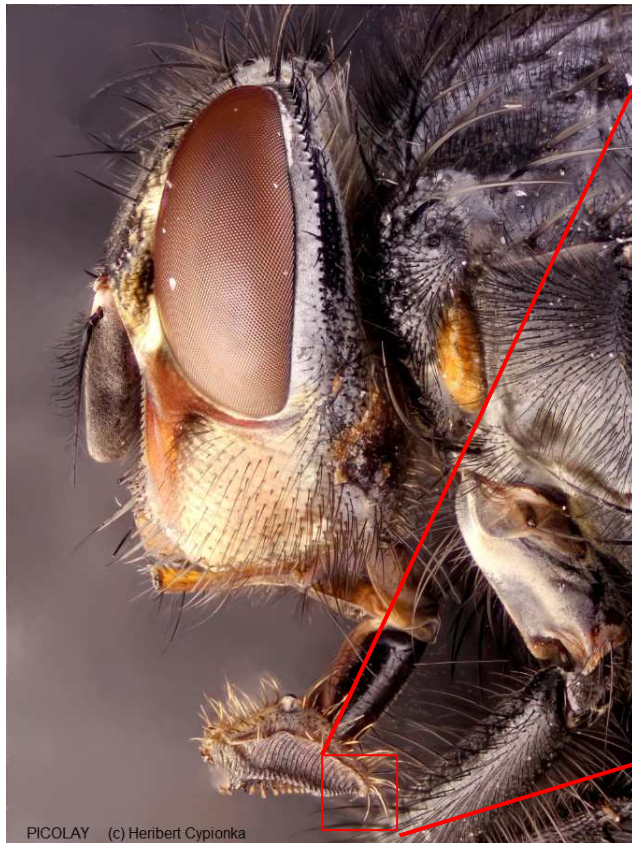


Stacking-Programme im Vergleich (2)



Stacking-Programme im Vergleich (3)

Entwicklung und Bildbearbeitung



Juli 2012



Juni 2013
(unbearbeitet)

PICOLAY



(c) Heribert Cypionka



Zecke, Minimum contrast = 0



Minimum contrast = 1



Kanten und weiße Flächen geklont (1 → 0)

PICOLAY



(c) Herbert Cypionka



PICOLAY (c) Heribert Cypionka



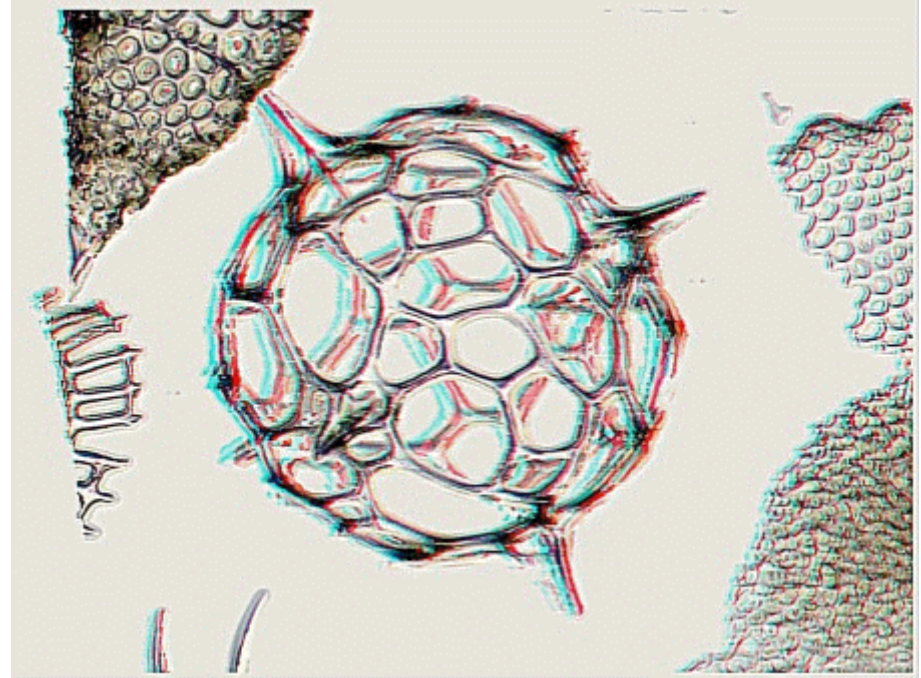
Hallersches Organ am ersten Beinpaar (160 x)

Hologramm-Stacking

Tiefenkarten-basiert



Hologramm



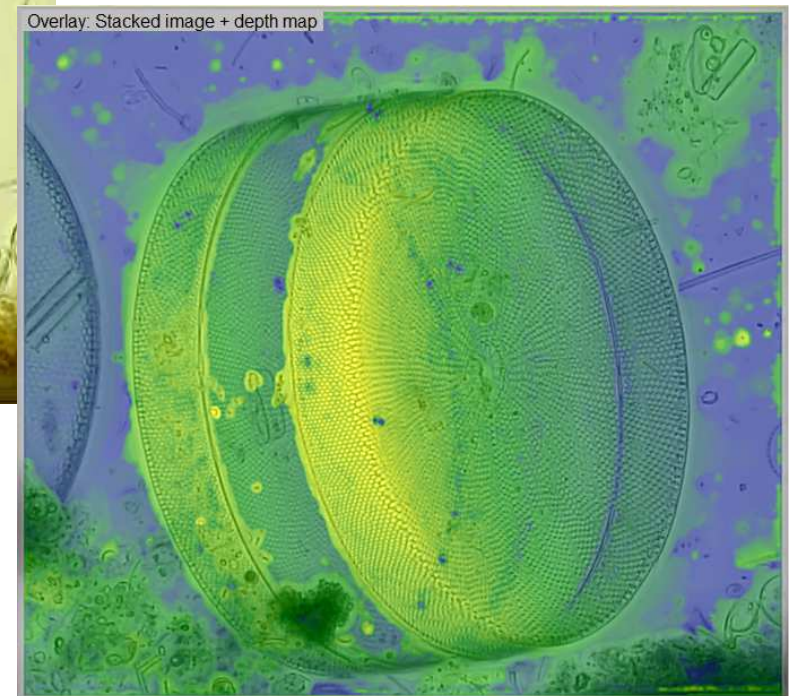
Bilderstapel von Eberhard Raap...

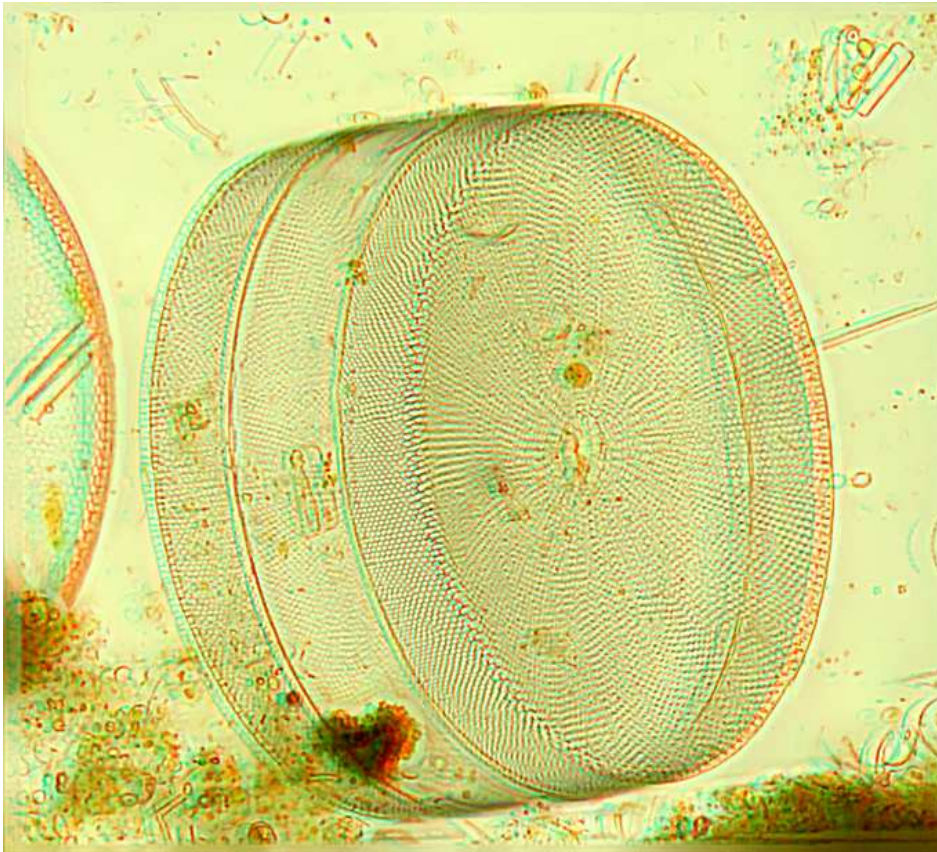


Coscinodiscus

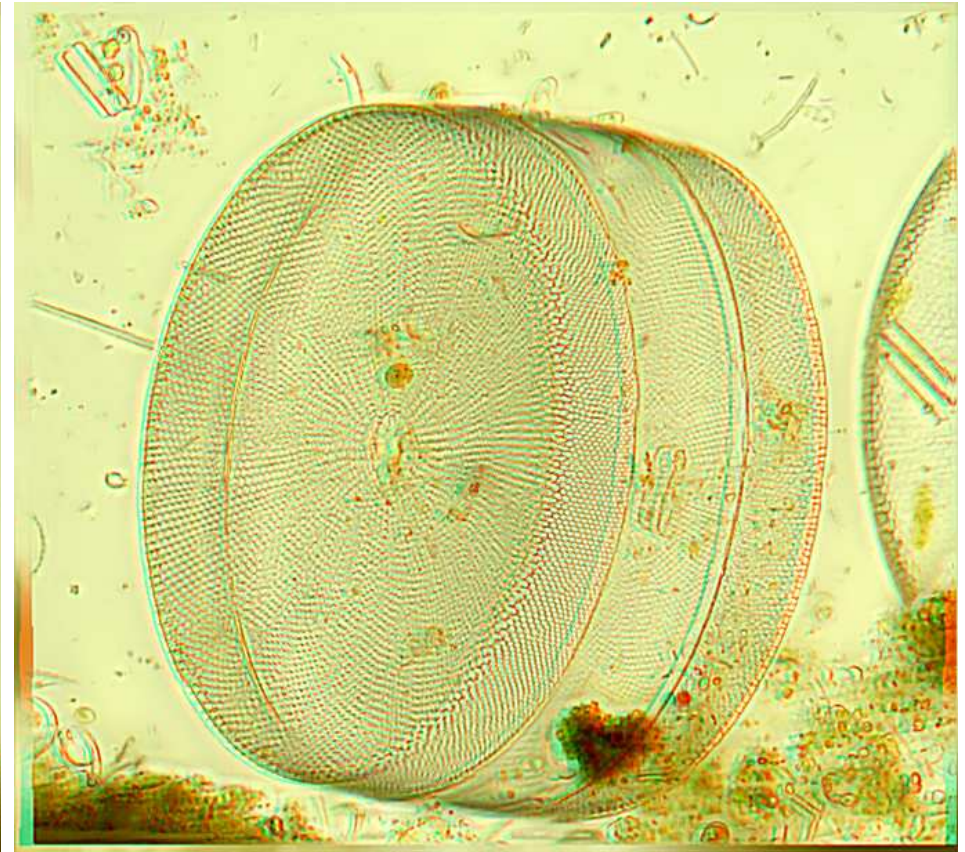


gestackt





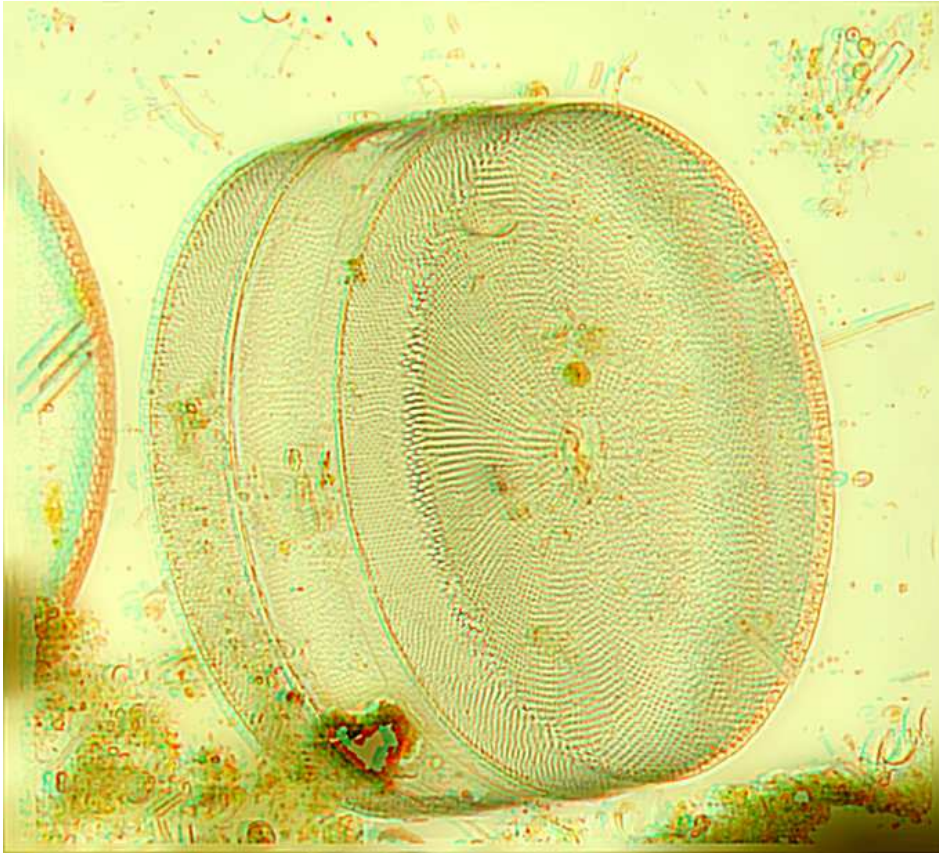
$Y = 0^\circ$



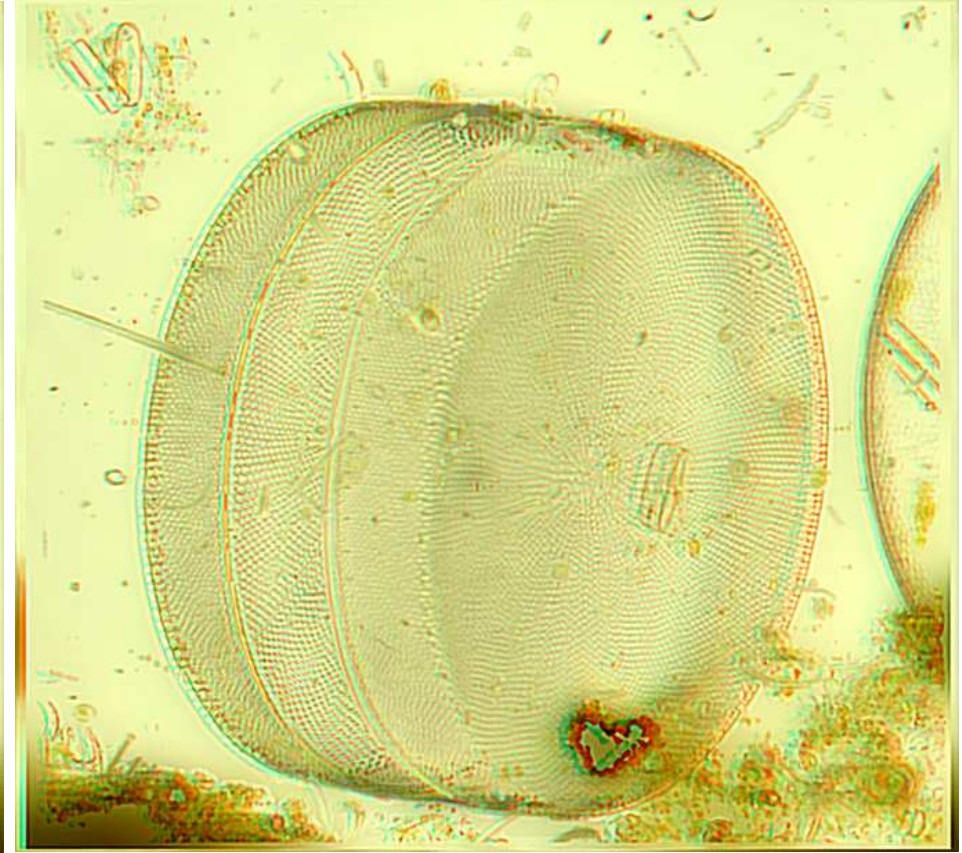
$Y = 180^\circ$

3D: Kartenbasiert





$Y = 0^\circ$



$Y = 180^\circ$

3D: Hologramm



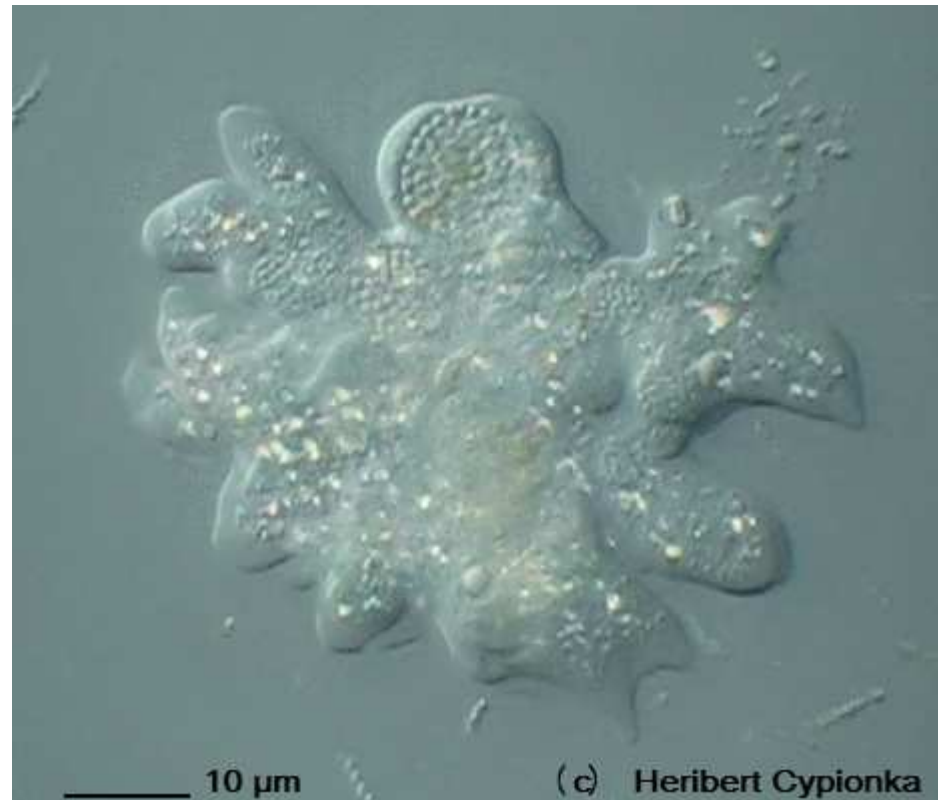
Tipps & Tricks

picolay.de

Things you can do with PICOLAY

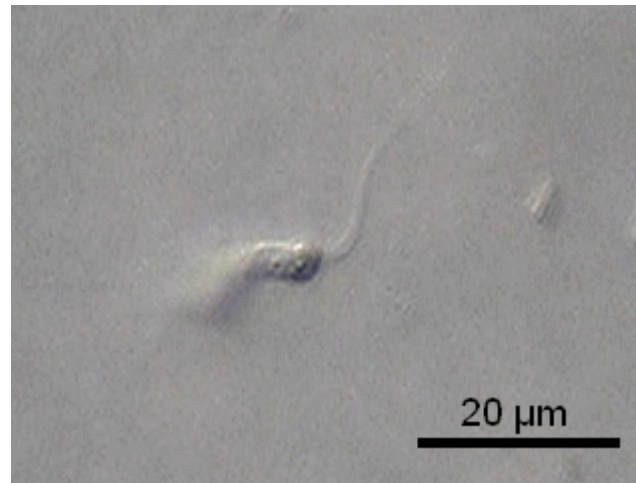
- 1. Browse images of a list at constant position and size
- 2. Display images of a list as slide show
- 3. Generate an animated gif file
- 4. Cut the edges of one or all images in the list
- 5. Resize one or all images of the list
- 6. Rename images
- 7. Change the file format of images
- 8. Delete selected images from disk
- 9. Add or subtract images from one another
- 10. Convert coloured images to grey scale
- 11. Increase sharpness
- 12. Increase contrast
- 13. Increase colour saturation
- 14. Change gamma value
- 15. Change brightness
- 16. Add or subtract offset or percentage to the red, green or blue channel
- 17. Run a median filter over one or all images of your list
- 18. Rotate images by any angle
- 19. Flip images horizontally or vertically
- 20. Generate negatives of images
- 21. Select sharp areas from an image stack (focus stacking)
- 22. Select areas with a target colour from your stack
- 23. Average images
- 24. Generate and insert intermediate images between the images of your stack
- 25. Align displaced images of your stack with respect to x- and y-positions
- 26. Harmonise brightness of the images in your stack
- 27. Set white balance of one or all images in your stack
- 28. Set a smooth background (flat field) by removal of disturbing items from your stack
- 29. Divide RGB values of images by those of the first image in the list
- 30. Generate a depth map of your stack
- 31. Generate 3D images from depth map and stacked image.
- 32. Generate red-cyan images for anaglyph goggles
- 33. Generate (2 or 4) separate images for a 3D observation with parallel or crossed eyes
- 34. Generate spatial projections of stacked objects from any angle
- 35. Generate 3D hologram views that allow to display covered structural details
- 36. Generate rocking and rotating animations in 3D
- 37. Generate 3D images for defined observation distances (viewing angles)
- 38. Let 3D images appear in front of or behind the screen
- 39. Paint on images
- 40. Blur disturbing details
- 41. Clone (= copy) parts of an image to other areas
- 42. Clone areas of original images to the stacked result (including depth map information)
- 43. Write text on images horizontally or vertically with any font and size
- 44. Draw a scale bar (rectangle with any colour and size)

Tipp: Videostacking



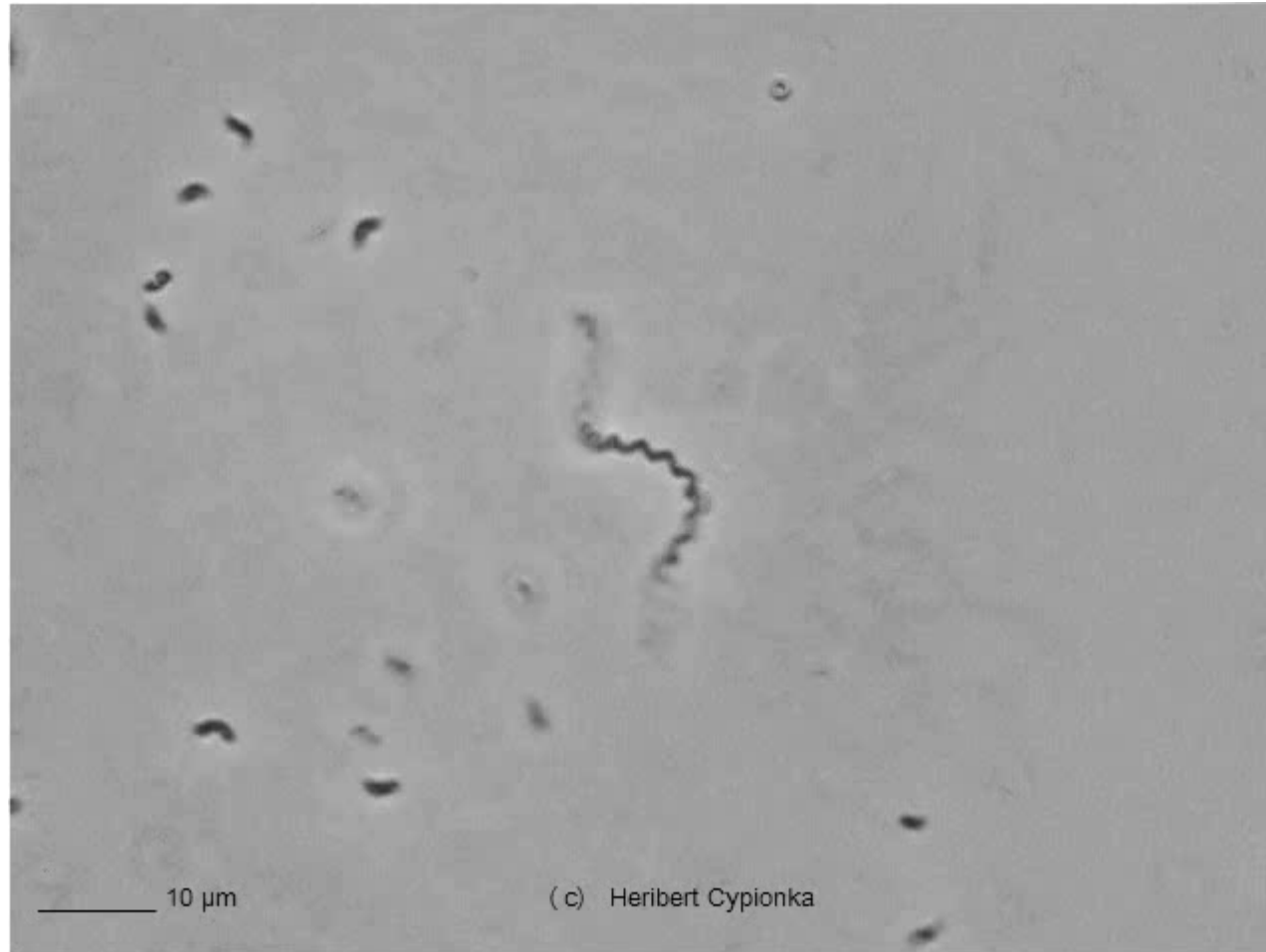
- Objekt durch das 10x Objektiv gefilmt bei Full-HD-Auflösung (Canon EOS 550D), dabei einfach innerhalb von 5 sec durchfokussiert
- mov-Video mit der Freeware xmediarecode in avi-File umgewandelt
- mit der Freeware virtualdub daraus 100 jpg-Files extrahiert
- mit PICOLAY beschnitten, Weißabgleich durchgeführt und gestackt

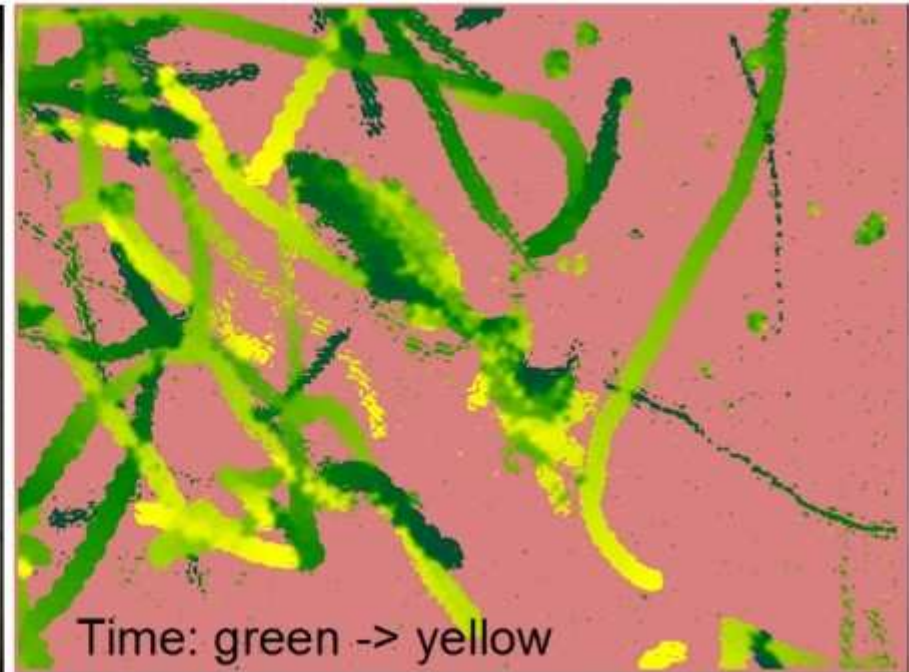
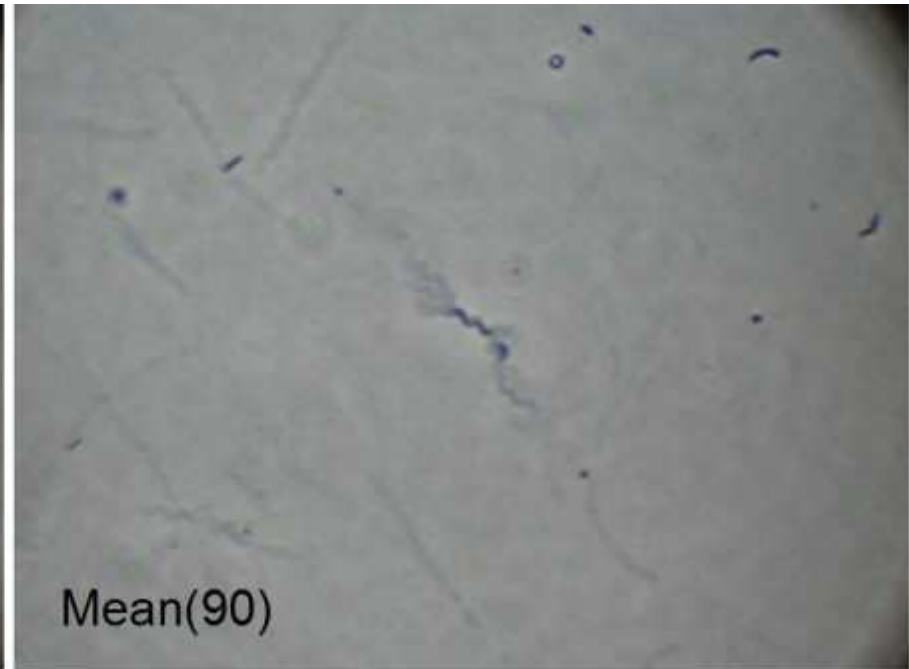
Tipp: Animiertes Gif-Bild statt Stacking



Extrahierte Filmsequenz (30 frames/sec)

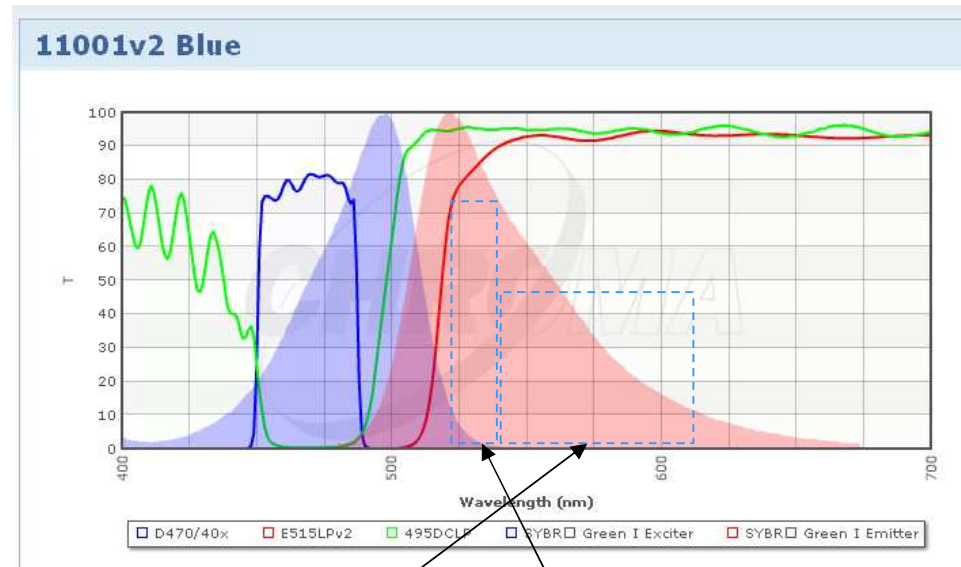
Tipp: Videoanalyse zur zeitlichen Prozessanalyse



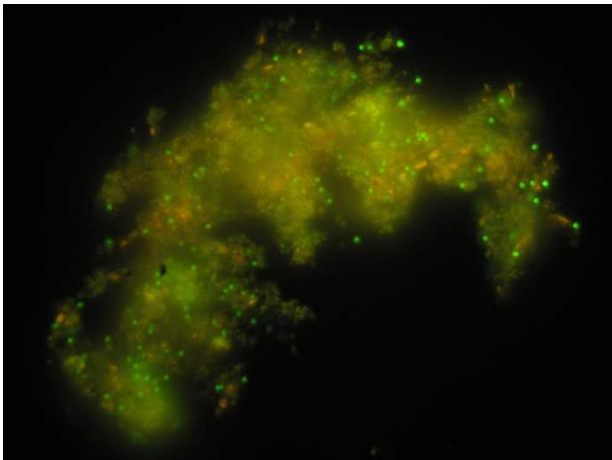


Tipp: Farb-Extraktion und -Subtraktion

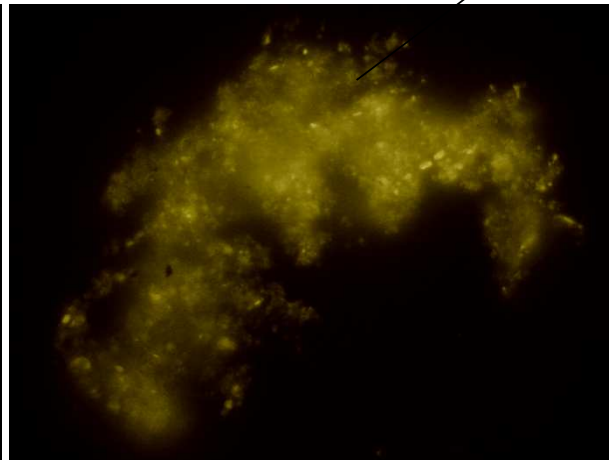
Fluoreszenz-Farbstoff:
SYBRGreen I



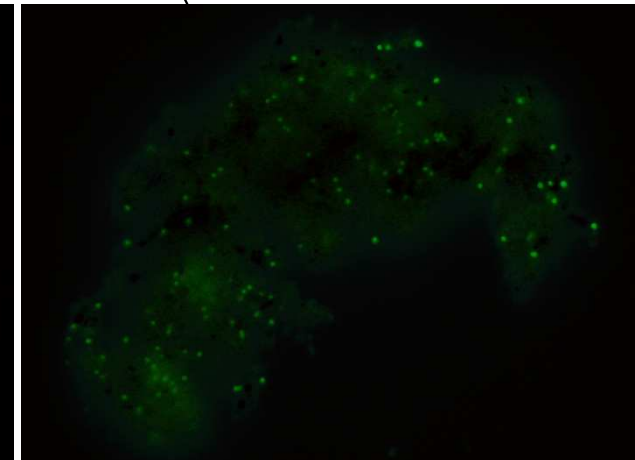
Fluoreszenzbild



SYBR 'Spam'



Differenz



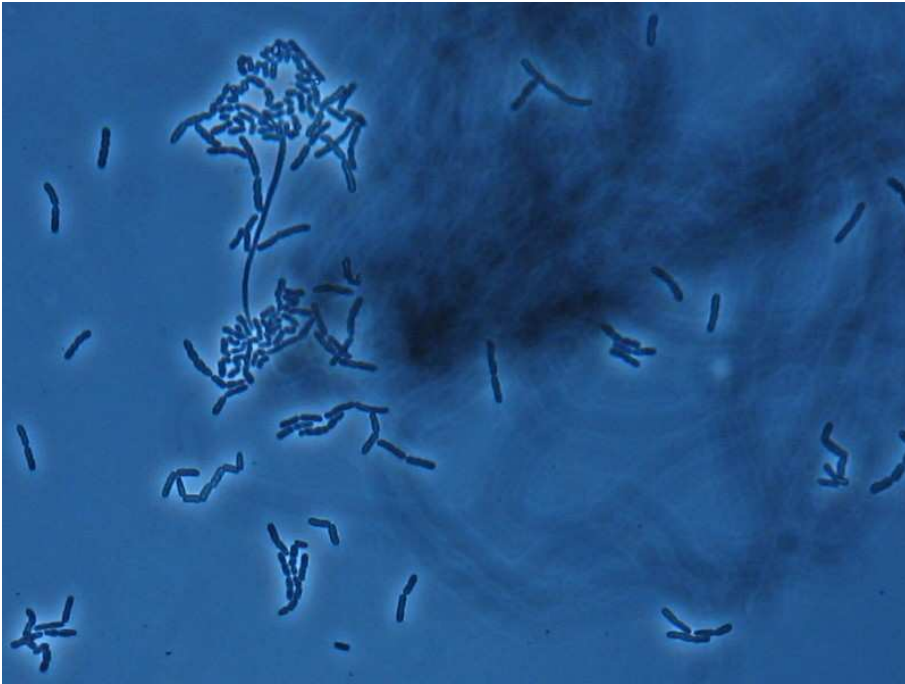
Sedimentflocke aus
dem Schwarzen Meer

**Tipp: Weißabgleich
(Set White Balance)**



1 Klick mit der RECHTEN
Maustaste in den
farblosen Bereich ...

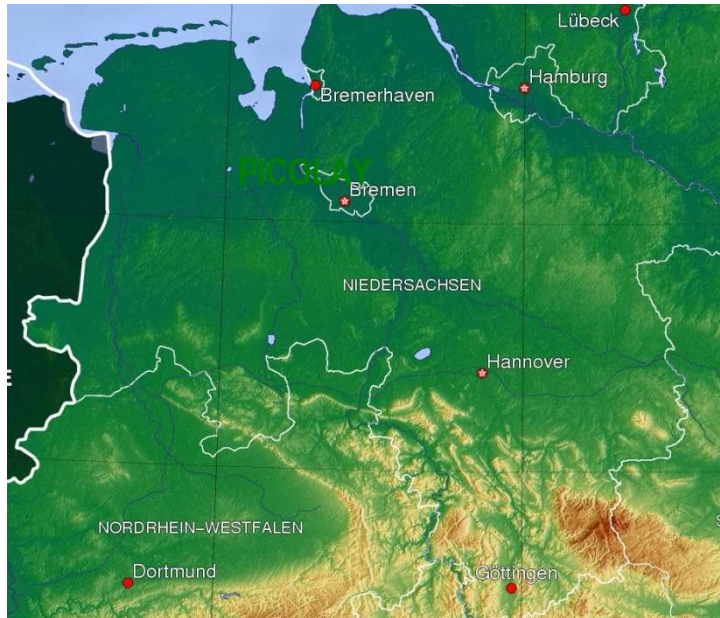




Tipp: Digitale Entfernung von Schmutzpartikeln etc. außerhalb der Objektebene

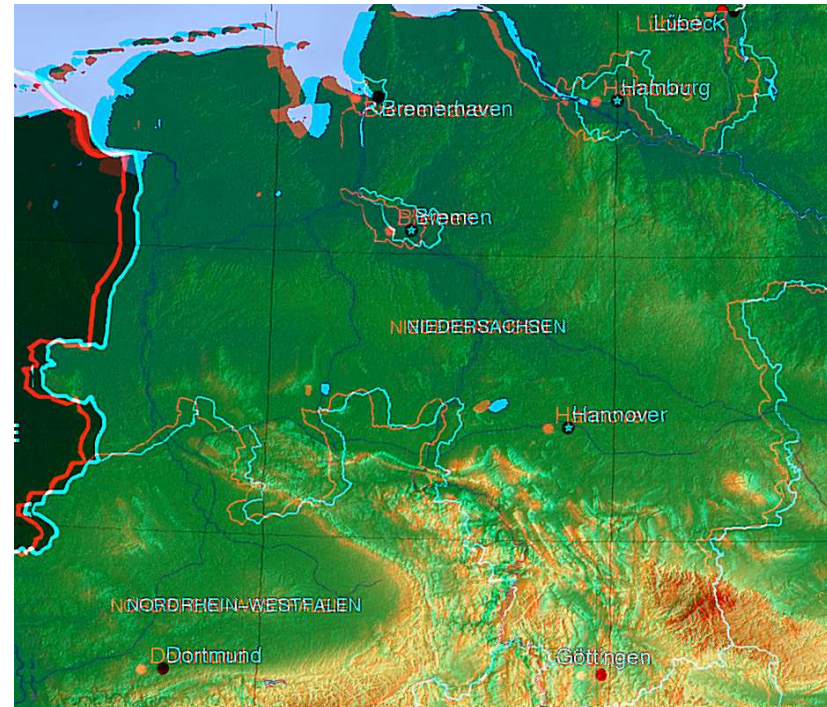
- Bilder mit und ohne Objekt (oder über- & unterhalb des Objekts) aufnehmen
- Subtraktion der Differenz zwischen 'Dreck-Pixeln' und Hintergrundfarbe

(Set background/flat field)



PICOLAY → Copy to depth map

Landkarte mit Höhen-Farbcode
→ Copy to Result window



→ 3D-Bild 😊

Tipp: Für die 3D-Darstellung reicht es, das gestackte Bild und die Tiefenkarte zu speichern



Tipp: 3D-Objekte möglichst durchstacken



Tipp: 3D-TV

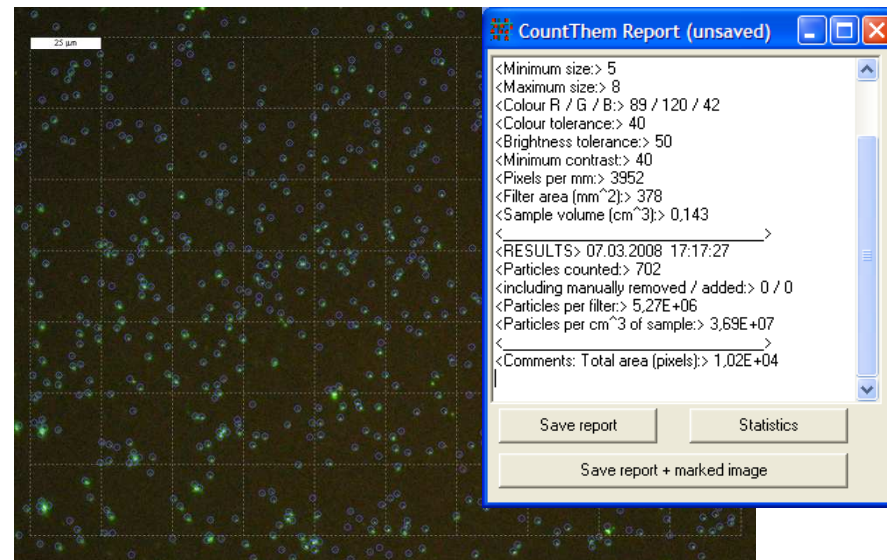
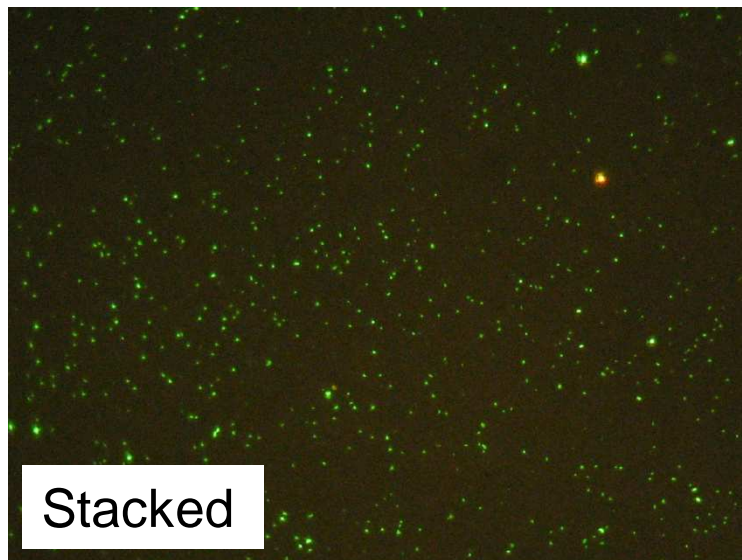
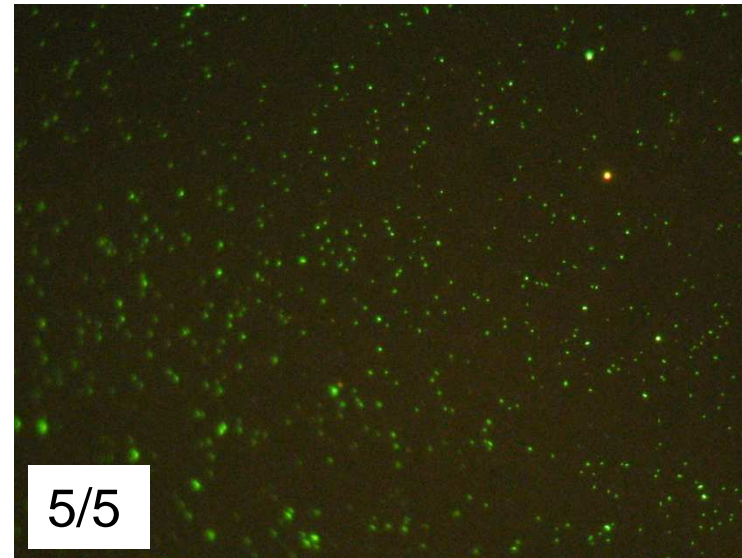
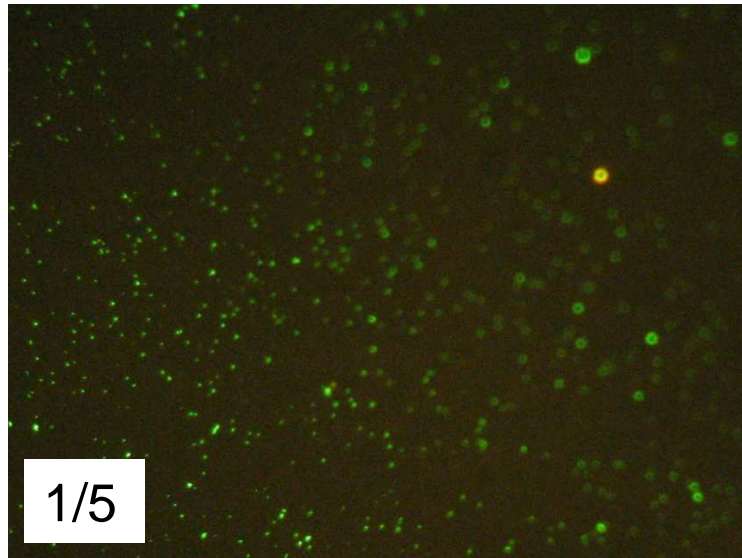
Den eindrucksvollsten 3D-Eindruck erhält man mit großen 3D-Fernsehern, z.B. 42 oder 47 Zoll von LG mit günstigen Polarisationsbrillen (wie im Kino).

Tipp: 3D-Monitor

Für die Arbeit am Computer eignen sich 3D-Full-HD-Monitore, z.B. 27 Zoll von LG mit den gleichen Polarisationsbrillen.

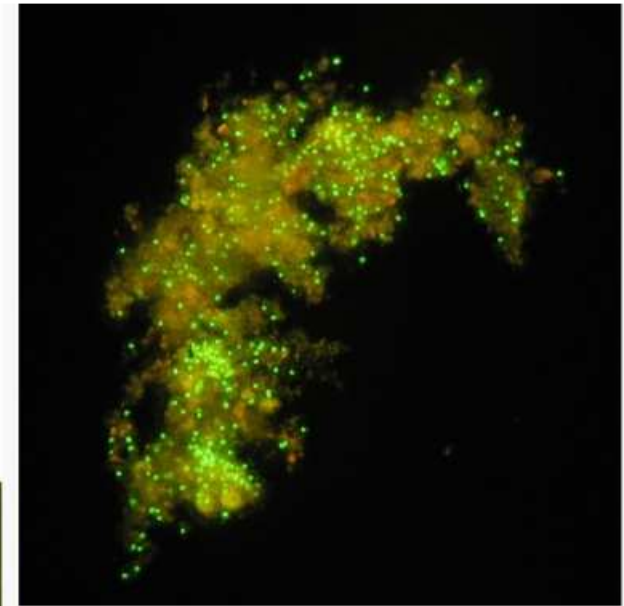
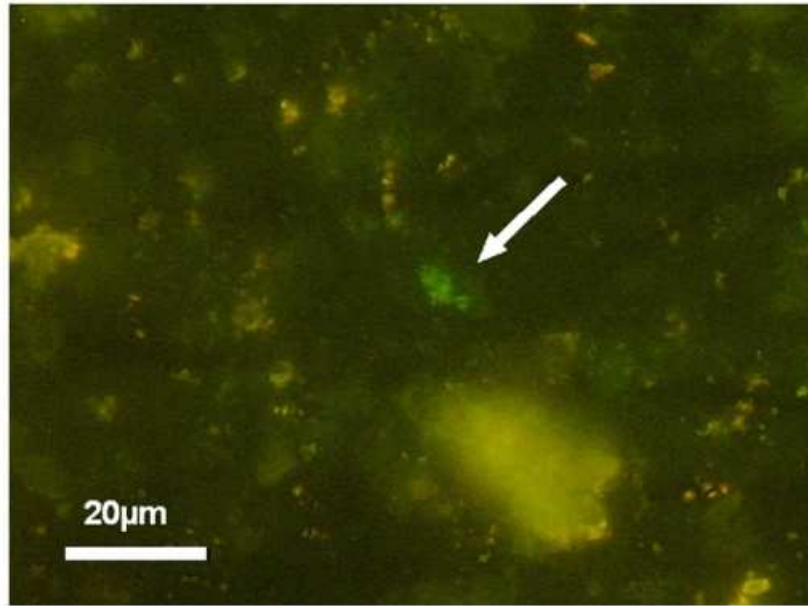
Einige Beispiele

Fluoreszierende Zellen auf Filtern zählen...



www.picolay.de

CountThem

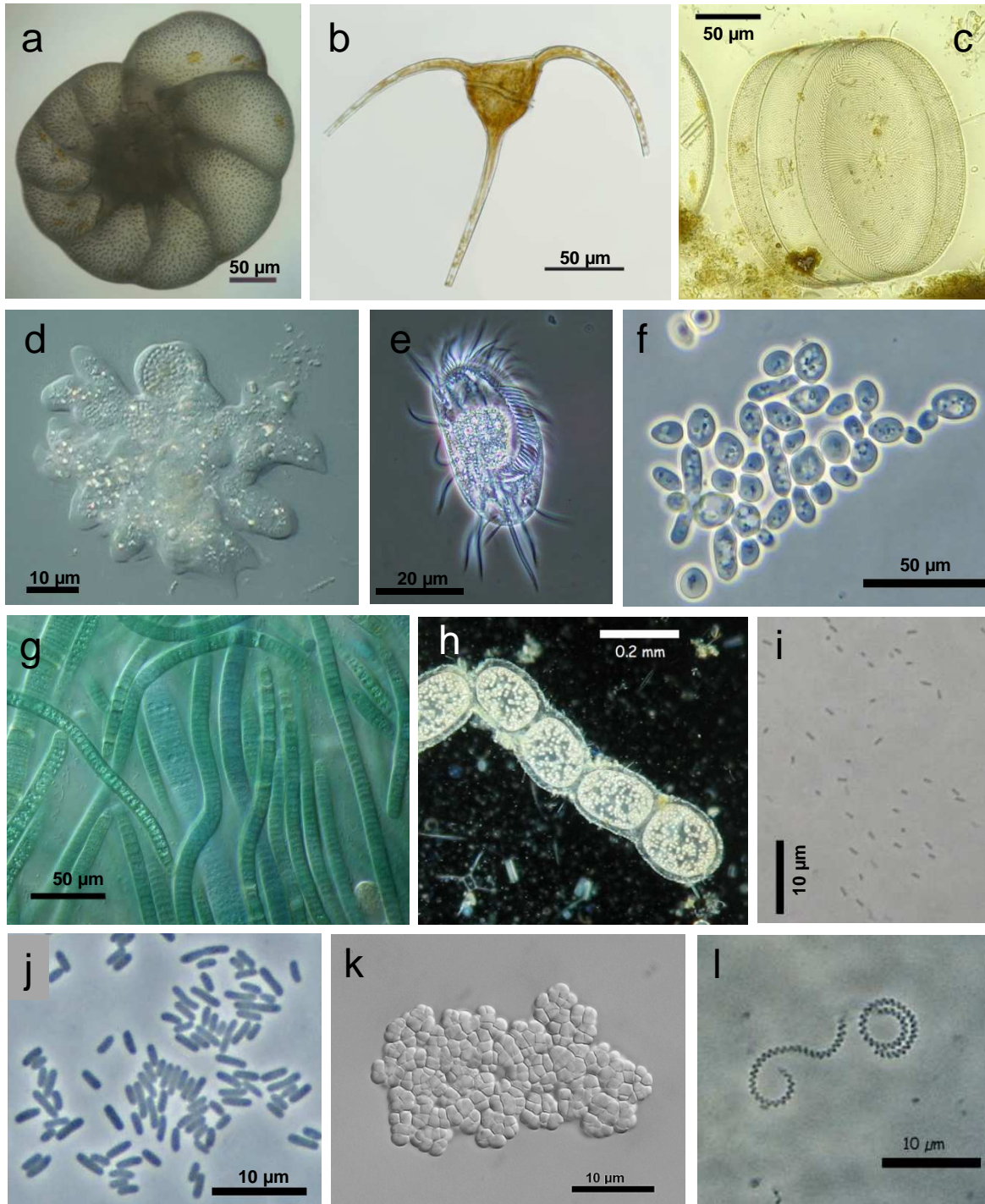


Sedimentflocke aus jungem Sediment (2000 m Wassertiefe)

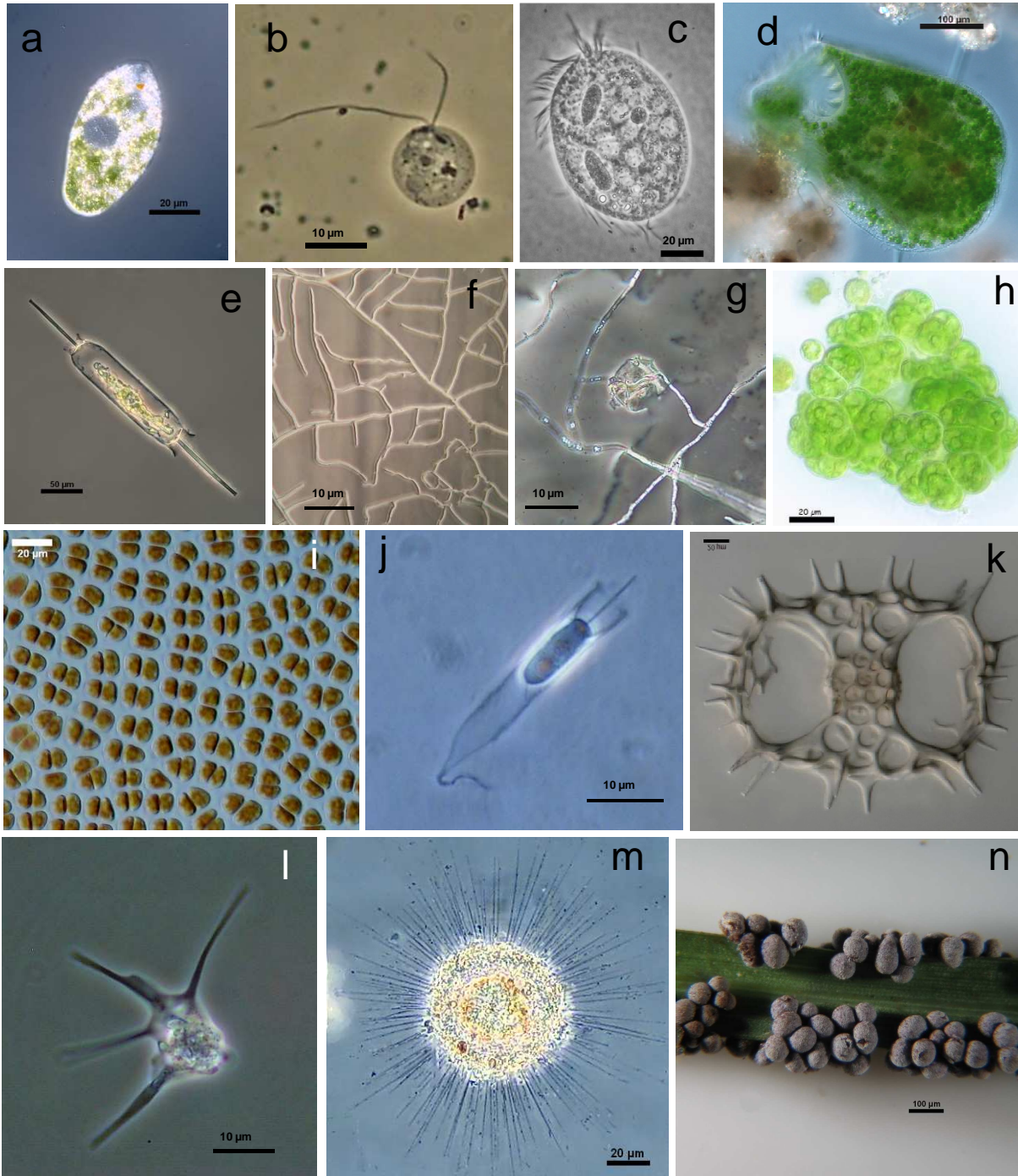
© Heribert Cypionka

Mikrokolonie in ca. 120 000 Jahre altem Sediment (8 m langer Kern aus dem Schwarzen Meer, Eem-Zeitalter)

Wissenschaftliches Highlight



**Aus dem
Lehrbuch – die
meisten Bilder
gestackt...**



Aus dem
 Lehrbuch – die
 meisten Bilder
 gestackt...

PICOLAY-Anwendung

Workflow

und viele weitere Informationen...

... bitte unter www.picolay.de herunterladen