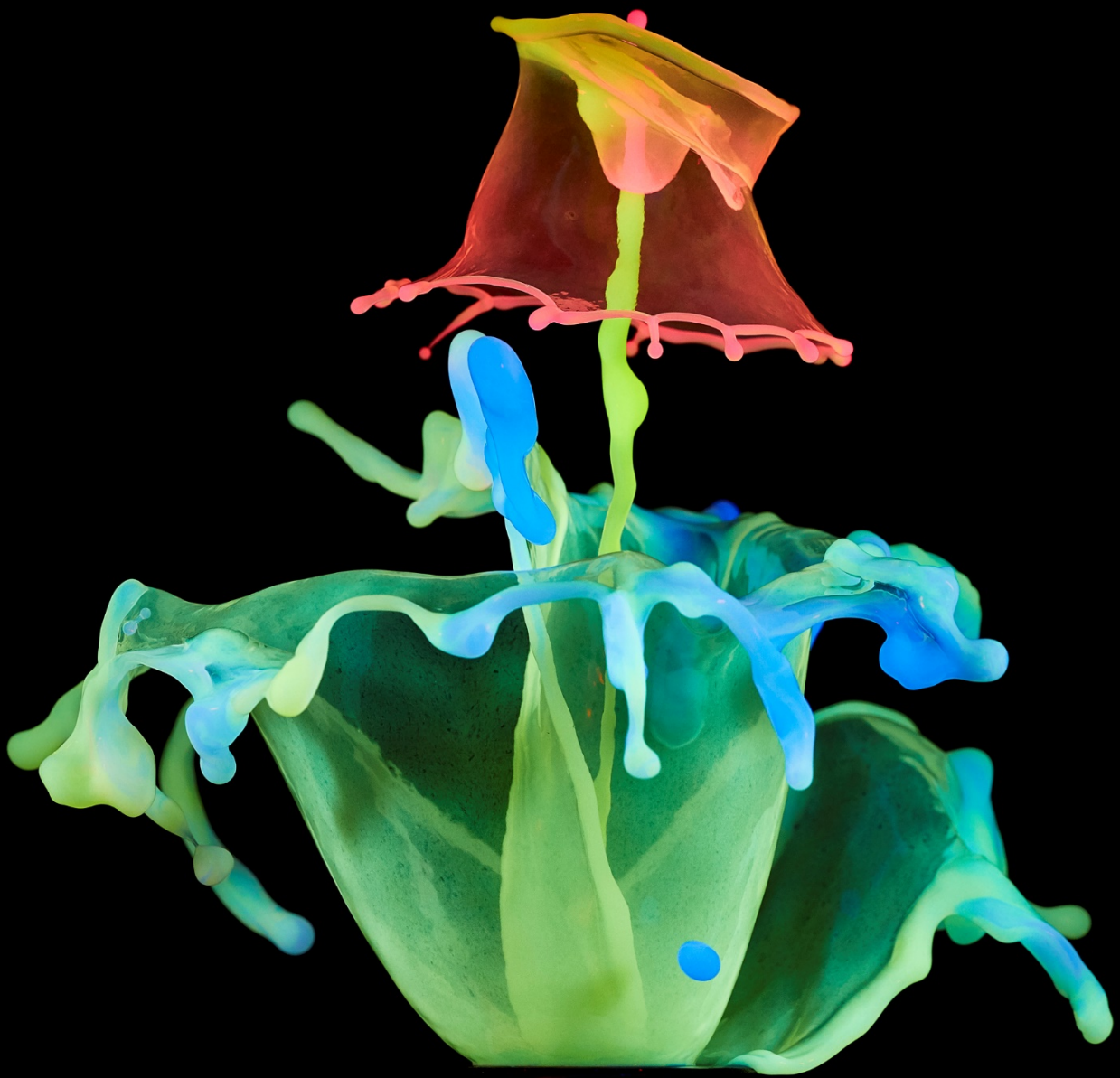
HIGH-SPEED PHOTOGRAPHY

ENGLISH EDITION

DANIEL NIMMERVOLL

ARTISTIC DROP PHOTOS
IN PERFECTION

NIMMERVOLL
PHOTOGRAPHY



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English edition

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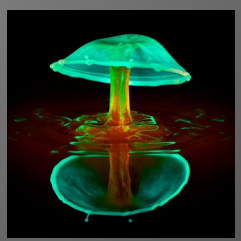

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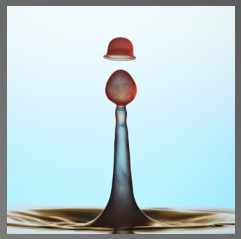

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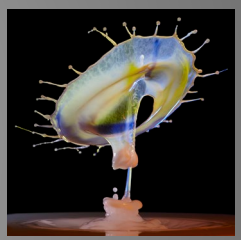

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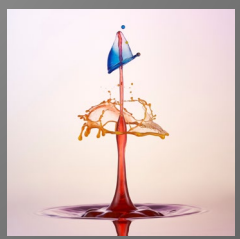

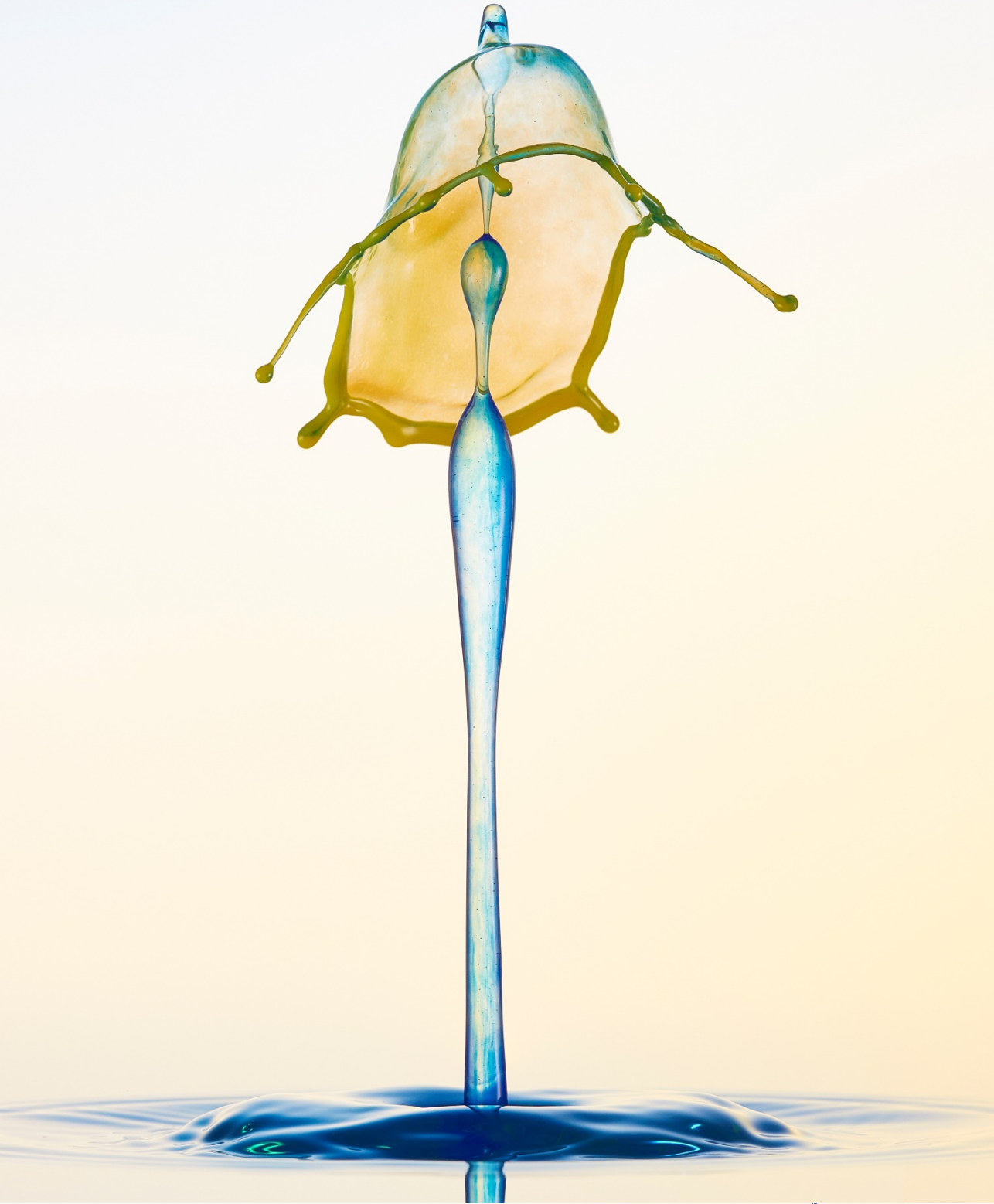

Chapter 1

Introduction

1.1 ABOUT THE AUTHOR

I'd like to introduce myself first. My name is Daniel Nimmervoll, I was born in 1981 in Linz, Austria and I work as a chemical technologist. I have a son from my first marriage and together with my second wife, whom I love more than anything, I live in a house I built myself in a small village in Upper Austria.

Illustration 1.1
The wedding with the woman of my dreams on 18 August 2018

At the end of 2007 I started to intensify my photography work. At that time, I bought a Nikon D80 with a Nikon 18-200mm lens which I thought would cover all photographic situations.

It was not long before I realised that there is no lens for all situations. As I was initially interested in macro photography (insects) I bought a Sigma Macro 150mm 2.8 only a few months later.

In June 2009, I switched to Canon and bought the EOS 5D Mark II. The Nikon equipment was sold and from the proceeds I acquired some lenses, flashes and other accessories.

In the beginning of 2017 I bought the Canon 5D Mark IV. The 5D Mark II has since been my backup camera, should the new one let me down.

I'd call myself an ambitious hobby photographer who is not satisfied with standard snapshots. I'm constantly on the lookout for new challenges which I try to take on with absolute professionality.

In December 2010 I stumbled upon this thread in the DSLR forum: *https://www.dslr-forum.de/showthread.php?t=407068*. I promptly caught the „drop virus". Unfortunately, in the spring of 2013, all pictures got lost due to a problem of the forum. Therefore, the first 808 pages don't show any photos anymore. In any case, the development of this type of photography can be followed closely. The small but mighty group called 'World of Drops', founded by Fotheo Bocholt, can be found on Facebook and is relatively active.

Questions within that group are usually answered within a few hours or even minutes.

Meanwhile, the best drop photographers, including ones outside of Europe, are represented in this group. They present their latest work and help each other with tips. I myself regularly show new photos

relating to the topic. As I couldn't find a Facebook group that related to ballistics photography I founded one myself. It is called „Ballistic Photography" and already has a few members.

Illustration 1.2
Daniel Nimmervoll

I am no friend of long paragraphs if the content can be relayed in a few lines as well. This book is no novel, it is a specialist book in which I describe how I get to my photographic results short and on point. And above all, it should be an extensive How To for drop photography.

Reading a book about a specific topic I don't want to read enormous descriptions, I want to get to useful results fast. I hope I implemented this approach in the third edition of my book „High-speed photography" with success.

Please find more info on my website: *https://www.nimmervoll.org*

1.2 WHO IS THIS BOOK FOR?

For those who are interested in high-speed photography. For those who have always asked themselves how water drop and ballistics photos, that include shooting at lightbulbs, are made. Above all, this book is for those who want to start with water drop photography without spending days, weeks or even months online to laboriously pick out the necessary knowledge and instead want to sit comfortably on the couch holding a complete summary of this topic in their hands.

However, this book is not only for beginners; advanced photographers will find their money's worth in this book as well. It is an exciting and extensive topic. Above all, you need fast flash durations to capture those short-lived moments invisible to the naked eye, as sharp and brilliantly as possible. That's exactly what fascinates and captivates me so much about these recordings.

You can see details on the camera display that are invisible to the naked eye. When I started with drop photography back then, I was so enthusiastic after the first shooting that I have not been able to get rid of the 'drop virus' until today.

No shooting is like the other, every time new shapes emerge. Even after all these years, it still happens that a shape or a figure of water occurs that I have never produced before. I am creative with it, and there is an infinite number of possible combinations - be it the background colour, the viscosity of the dropping liquid or its colour, or simply the temperature of the water used. Everything influences each other, and every little detail changes the conditions for this type of photography.

During a workshop once, a participant asked me if the moon could influence the shapes created. A truly interesting question which – unfortunately – I couldn't answer as I have not investigated this myself. An overly large impact may not be expected, but of course it might be possible, considering the huge amounts of water the moon can move at low and high tide.

1.3 NEWS SINCE THE 2ND EDITION

When I started on the first edition, writing a book was a whole new experience for me. Of course, you do not think of everything you want to include and only later realise the opportunity for improvement.

Reason enough to write an improved second edition. After the publication of the first edition I received a lot of emails from readers. I was happy to be able to meet new people through that. In fact, everyone was very positive and enthusiastic, but many readers still had questions. Of course, I saved all emails and answered all of the questions in the second edition. Since the release of the first edition I held several workshops with beginners in high-speed photography. Both my participants and I were able to learn something new. It also gave me a special insight into what beginners are struggling with. These experiences influenced the second edition of this book in 2014.

In early 2018 I decided to write a third edition. My knowledge has expanded which of course I included in this book. By now I have held countless workshops. People from all over the world came and still come to me to benefit from my knowledge. I receive emails daily which enables me to answer a lot of questions. As a result, I keep up with the latest developments and am able to expand my knowledge.

To begin with, in this third edition, I brought this book up to date. Furthermore, there are three major areas I have included.

I will show you how to make water sculptures glow with special UV flashes and fluorescent colours. Another fantastic technique has recently given me the opportunity to create extraordinary water sculptures, for example, twisted water pillars, spiral shapes and much more. The

technique is called „Plastic based 3D printing process“. I am able to create specific nozzles with a 3D printer. It's like a whole new world, a new era in waterdrop photography. This technique opens up sheer infinite possibilities.

My third new topic in this edition is Water Wigs. With that, I filled so-called modelling balloons with water and placed them around the head of a model. Using a special trigger, I was able to reliably set off the flashes in the exact millisecond and was able to create 100% reproducible results.

I hope that through that I am able to show you high-speed photography in a simple way.

You might have noticed the black and white pixel graphics further up. These so-called QR codes are mainly included to ensure a more pleasant reading experience. If you own a smartphone or tablet you can scan these graphics and access links on your device, comfortably from the couch. So, a QR code is nothing more than a link. In some areas, I have included short videos as I had the opportunity to use a high-speed video camera. Using that, I was able to film the exact creation of single water sculptures with 4000 frames per second. Of course, I don't want to withhold this from you, especially as these videos are a big help for beginners and advanced photographers. It's no problem if you don't have a smartphone or tablet. Naturally, I include the direct link in the book. You only need to copy the link into the address bar of your internet browser.

1.4 STRUCTURE OF THE BOOK

After I introduced myself, and maybe you have visited my homepage already, I start with the basics of high-speed photography – the way most drop photographers, including me, have started. With cheap tools. You don't need to invest several 100 euros in expensive technology to capture simple drops, provided you already own a camera and a lens.

Next we move onto equipment and the technique specially needed for high-speed photography and reproducible results. That gives you the advantage of being able to concentrate better on light and special shapes.

Time doesn't stop and neither does technology. StopShot has evolved into StopShot Studio and I have been using the GlimpseCatcher for quite some time now. I cover this topic in chapter 3 „Equipment“. You won't get around the one or other DIY lesson. I will show you how you can build a water basin and a wooden structure step by step.

After that it is about setting light. An important factor are flashes that have an extremely short flash duration. You can read in chapter 4 „lighting“ which ones

those are and what settings are needed. Furthermore, I will show you how to make sculptures glow by using specific UV flashes and fluorescent colours.

In chapter 5 „Drop liquids“ I explain in detail how I prepare my drop liquids – what I add to them to get the correct viscosity and how I filter these to ensure the drops come out clear.

In chapter 6 „Variations and setups“ I show the different drop shapes with each respective setup and what needs to be watched closely to create a beautiful soft colour gradient in the background or how to place lights selectively on a black background.

In chapter 7 „Reproducibility“ I analyse water and show my thoughts regarding the technique of getting reproducible results. For example, I explore if the air movements in the room or the slight tap of the solenoid valve can influence the velocity of fall or the flight path of a water drop.

In chapter 8 „Custom nozzles“ I present my custom printed nozzles that come straight out of a 3D printer. This technique allows for extraordinary water sculptures.

In chapter 9 „Water Wigs“ I show you how you can use high-speed photography with people. Spectacular and extraordinary results with a wow-effect are guaranteed.

In chapter 10 „Aqua Splash“ I drop different types of fruits and vegetables and even lightbulbs into water. You will find out here how to set light correctly in order not to get reflections in the glass of the aquarium.

Chapter 11 „Ballistics“ is about the master class. How does the structure of a ballistics shooting look like? What is the structure of a ballistics shoot? Which projectile or light barrier system is suitable?

Finally, in chapter 12 „Image editing“, I explain how, using the program Photoshop, I provide my photos with a finishing touch.

For all those who are crazy about drop photography, you can find a shopping list with links to all shops that I frequent to buy all necessary material. I update this list regularly, here is the link: *https://www.nimmervoll.org/workshops/einkaufsliste/*

Tip

The book is set up to increase in difficulty, so it would be best to start at the beginning. Certain terms are explained only once and won't be repeated later.

Later, you should gain first practical experience through several shootings, for which you may like to use the book for reference. I recommend reading the book again after a couple of weeks or months. You will notice that you are discovering several aspects you might not have registered the first time around.

With that I wish you a lot of enjoyable reading and lots of creative hours.

Chapter 2

Basic principles

How to make water drop photos without expensive equipment? That's exactly what I want to explain in this chapter. When I first tried capturing water drop photos at the end of December 2010, I didn't know yet how much enthusiasm this kind of photography would trigger in me. For that reason, at the beginning I used the simplest of tools, e.g. an infusion set and a water tray to create the first fascinating results.

Illustration 2.1
Infusion set for dripping

INFUSION SET

I got the infusion set in a hospital. You should also be able to find something similar in a pharmacy.

It is best to hang the infusion set from the ceiling. I simply attached it to a lampshade with a piece of string. Of course, this construction is a bit shaky and not very stable. The hose will dangle back and forth a bit. It may help to cut the hose slightly or wrap it around something, after a few seconds or minutes it should stay relatively still. If you want to stabilise it even further, you can build a similar wooden structure as the one I built later. This allows you to attach the bottle on the top and the hose with the nozzle on a crossbeam a bit further down. The wooden structure can be seen in chapter 3 'Equipment'. This should make the whole thing more stable. Back then I had enough with an easy and quick attachment for the first splash shots. You may also have lamp tripods or something similar in your studio which you can use. Essentially, you just need to attach the bottle somewhere and place the hose with the nozzle outlet underneath.

Once the bottle was filled with the drop water I punched a hole in the top. Otherwise it may happen that the dripping speed later diminishes due to the slight negative pressure that arises in the bottle. To get a DoD (Drop on Drop), open the regulation until the dripping speed reaches roughly ten drops per second. The water

should flow just enough that there are only drops and not a stream. If the drop rate is too low, a DoD is not possible.

The nozzle outlet should be aligned as straight as possible. If it is slightly slanted, the drops obtain a certain twist and don't fall straight down.

WATER TRAY

A baking tray filled with water serves as a dripping pad. You can use other containers such as a salad bowl. However, using a baking tray will result in the best outcome as you will achieve an ideal water depth of roughly 25mm. The pillars of the drops become slightly higher through that. Alternatively, you can build a proper water basin out of acrylic glass, described in section 3.4.

LIGHTING

One of the most important criteria is lighting. If the light is set well, the drop photo will look much better than with bad lighting.

It is best to use a normal flash and place it behind the baking tray, facing the camera. The flash should be set to 'Manual' and a flash output of 1/32 to 1/128. The lower the flash output, the shorter the flash duration, and thus less motion blur.

Basically, the flash output is the time in which the flash is lit. This lighting time is crucial for high-speed photography! I trigger the flash with a radio transmitter. As a diffuser, I placed an acrylic glass pane in front of the flash. More in chapter 4 'Lighting'.

CAMERA SETTINGS

To achieve enough depth of field, the f-number must be as large as possible or the aperture as small as possible. The aperture 16 on my camera has proven as an ideal compromise of enough depth of field and low diffraction blur.

Diffraction blur refers to the reduction of sharpness in optical images through the diffraction of light. Diffraction is present at each aperture. However, it is annoying only with small apertures (high f-number).

The shutter speeds of the camera are secondary, I mostly set it to 1/125 sec. The extremely fast movements are captured through the short flash duration of the flashes anyway. The important thing is, that a photo without flashes turns out completely black. Therefore, there mustn't be any direct sunlight in the room. Once the flash is set to 1/64, I adjust the image brightness through the ISO setting. If the image is too dark, I increase the ISO value; if it is overexposed, I reduce it. Usually, the ISO ranges between 200 and 400. In case of a photo being overexposed despite an ISO of 200, I reduce the flash setting to 1/128 or move the flash further away from

the acrylic glass panel. I usually leave the focal length of the flashes at 24mm.

LENS

I use the Sigma Macro 150mm 2.8 for all my drop shots. The focal length of the lens is ideal for full-frame cameras, as the working distance is large enough to spare both camera and lens from water splashes. In addition, the lens has a very good and sharp imaging performance. In my previous insect pictures, this lens has turned out to be my favourite.

Of course, such an expensive lens is not needed right away. For now, you will also find pleasure with a kit lens. It depends on your own requirements. If you want to have super sharp images that match mine in quality, you will not get around a decent macro lens. If you are using a camera with a small APS-C sensor, I recommend a 90-105mm macro lens. Due to the crop factor, it would roughly result in the 150mm focal length that I am using.

ACCESSORIES

I attach the camera to a tripod and trigger it via a cable release. This allows me to operate the camera with one hand and simultaneously adjust the regulation of the drops or catch the drops with a cup.

Tip

When photographing manually, it is helpful to use a cup to catch falling drops so the surface of the water can calm down. As soon as it is calm, the cup can be pulled away briefly to allow for two or three drops. At the same time, I trigger the camera with my other hand.

DROP HEIGHT

You can experiment with the drop height as well. I usually use 35 to 40 cm from the nozzle outlet to the water surface. Every now and then I set the height to 60 cm. Most of the time, however, I'm not able to hit the ascending pillars as usual. This will make the cap angled and I end up with more rejects. However, the drop height does not have too much influence on the shape of each form.

Tip

You could also add one or two drops of clear dish soap to the water tray to reduce the surface tension. This results in the pillars rising another 1 or 2 cm. The downside of this is that it creates some bubbles that could ruin the photo. You should always remove those or add some defoamer to the water. This will result in the small bubbles disintegrating on the water surface. I no longer add dish soap. It is not necessary for creating XXL-DoDs anyway. I show how I produce these in section 6.3 'XXL-DoDs'.

THE DROP LIQUID

One very important aspect is the drop liquid. The viscosity has influence on the shapes. You have a lot of design options through colouring the liquid and you can be as creative as you want.

For getting started I would recommend using normal milk. It enables you to create appealing and calm shapes. Milk has the advantage of absorbing light very well. This benefits selective lighting. More in chapter 5 'Drop liquids'.

FOCUSING AID

Autofocus cannot be used in high-speed photography. Therefore, the focus is always set to Manual. As it is difficult to find the perfect focal point of a DoD when you can't see it, you need to use a focusing aid. To do this, I place a semi-big screw in the water tray and release one drop from above. I then either continue to advance the screw or the nozzle outlet, until the drop hits the centre of the screw tip.

Tip

Once the drop hits the tip perfectly, I push the screw roughly 1 cm towards the camera. This way, I can move the focal point a little bit forward. The reason: The depth of field of the camera, even with an aperture of 16, isn't enough to get the cap to be completely sharp. However, it looks better, when the front area through to the middle, including the water column, is sharp. The back area of the cap gets blurry, which in turn results in a better effect of depth. See Illustration 2.2.

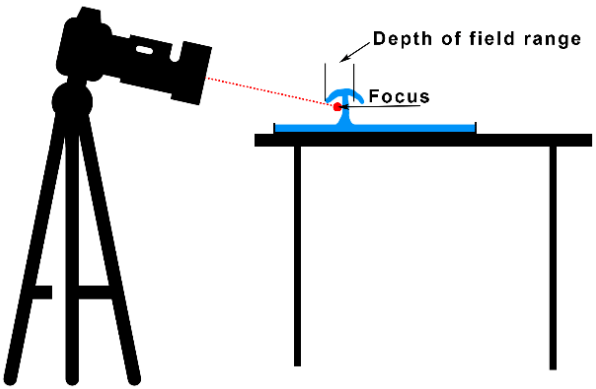

Illustration 2.2
Diagram for the correct focal point

Now I can position the screw in the viewfinder of the camera, just the way I want it later in my DoD. When aligning, I make sure that the camera is set exactly horizontal to the water surface. Even if the camera is tilted by only 0.5°, it will have a negative impact on the photo and you need to straighten it later while editing the photo. Most recent cameras already come with a built-in spirit level. Use it.

Illustration 2.3
My focusing aid. I added some weight below to make the screw steadier in the water and to prevent it from tumbling.

Then, you can set the focus perfectly onto the screw. I usually use the live view mode on my camera and zoom in at a level of 10x magnification. This allows for an exact focus.

It is important to make sure that the aperture is as open as possible, to achieve a shallow depth of field while focusing. Some cameras namely will reset to the working aperture in live view mode.

Once everything is set correctly, remove the screw and the shooting can begin.

Illustration 2.4
My focusing aid in action. You can see how perfectly the drop hit the tip.

THE FIRST ATTEMPT

Illustration 2.5
My first drop photo using normal tap water

Now, we finally arrive at the practical part. The infusion set contains water or milk, it is attached to the ceiling. The water tray with roughly 25 mm of water and one or two drops of dish soap in it is placed on the table. Camera and flash are ready to use.

> **Tip**
>
> If you use clear dish soap, I'd recommend putting it into a 5 litre canister and then filling it up with water. As a result, the dish soap mixes well with the water. One or two drops are enough.

I always check the lighting before I take the first drop photo. It's also important that the camera position is as flat as possible to the water surface. This will result in more beautiful reflections. The camera is to be aligned so the front and rear edge of the baking tray are only just not visible. Once the light is considered to be good in the first test photos, it's time to start.

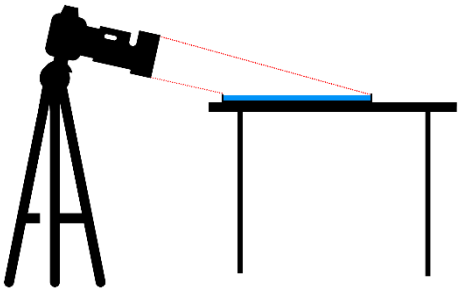

Illustration 2.6
The front edge of the tray should be the lower area of the photo and the rear edge should be the upper area.