**Best vintage digital cameras** Finest older compacts **for £50 or less** – and yes, they still take good photographs

# Passionate about photography since 1884 Wild at heat between the source of the source

# How to take winning wildlife shots

**Essential tips** for doing well in wildlife competitions and taking your bird and animal shots to a new level



### Celebrating Salgado

Peter Dench and an expert panel on why he's **so revered** 



**Shooting artwork** Turn photographs of art into your own masterpieces



Ultimate buying guide to mirrorless lenses: find the best glass for your camera today







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#### THIS WEEK'S CONTRIBUTORS



PETER DENCH On the anniversary

of Sebastião Salgado's *Workers*, Peter compiles a tribute to the great photographer



AILSA MCWHINNIE Acting Features Ed. Our APOY manager launches Round 2 and gives you tips for entering



AP's vintage

camera expert on

early digital

cameras that are

still very usable

and collectable

JAMES PATERSON The top pro guides you on the best way to light and photograph paintings, artwork and old prints



GIZ

JESSICA MILLER Dep. Online Editor Our social media manager selects more stunning reader images on page 46



Cano

dia *Ny Favourite Kit,* wildlife photographer Peter tells us s on which lens he can't live without





In the week that Sebastião Salgado was presented with the Outstanding Contribution to Photography award

by the WPO we present our own tribute to someone who, for me, is arguably the world's greatest living photographer. His ability to document some of the great global issues of our time, champion the world's most disenfranchised people and tell their stories, and do so with the most extraordinary aesthetic eye is without equal. Read our tribute on page 8. Also this week we show how to photograph flat artwork, and John Wade looks at usable cameras you can buy for £50. Yes that's right - we haven't missed a zero. Finally, don't forget to enter your best animal photos into Round 2 of APOY, for your chance to win a share of our £17.500 prize pot. Nigel Atherton, Editor



••

Our cover shot, taken by Nick Clayton, was fifth in last year's APOY wildlife round. See pages 34 and 36 for tips on entering this year's Animal Kingdom round

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The Google Magic Editor in action

# Google AI editing tools free for more phones

MORE Al-based photo-editing tools will become available from 15 May, with Google announcing that its Magic Editor will be free to use on Android and iPhone handsets and many Chromebook laptops. Magic Editor enables the easy placement or resizing of objects in an image, while also using generative Al to recreate the background when you shift a selected object.

Other Google AI tools about to become available to pretty much all smartphone users include the self-explanatory Magic Eraser, Photo Unblur and Portrait Light.

To use the Magic Editor and other tools, your phone must be running Android 8.0/iOS 15 or higher, or be a Chromebook Plus with ChromeOS version 118+ (or have at least 3GB of RAM).

While it sounds as if Google is being public-spirited here, there are caveats. First, you need to use Google Photos and are limited to ten free Magic Editor 'saves' a month. If you go over this limit, you will need to have access to a Google Pixel phone or sign up for a 2TB AI Premium Google One Plan. After a gratis two-month grace period, this works out at £18.99 a month, or nearly £230 a year. In comparison, the current tranche of Al-editing tools in Photoshop and Lightroom can be accessed for £10 a month via Adobe's Creative Cloud Photography Plan, or £120 a year.

### Budget Honor phone with 108MP camera

WITH the UK phone market dominated by Apple, Samsung and Google, other makers, notably from China, are jostling for a remaining slice of the pie. Back in March, Xiaomi announced the 14 and 14 Ultra, the latter featuring a one-inch sensor and stepless variable aperture; and now Honor has revealed the more budget-priced 90 Smart, with a 108MP main camera and 1/1.67in sensor.

The Honor 90 Smart also supports 9-in-1 pixel binning to achieve a pixel size measuring 1.92 $\mu$ m. According to the company, this enables the main camera, which has an aperture of f/1.75, to capture photos that remain bright and vivid even in low light. Other noteworthy

features include a Portrait mode with 2x optical zoom, extended battery life and a multi-video recording feature that enables the front and rear cameras to work simultaneously for 'more harmonious' vlogs. The Honor 90 Smart also has a 2MP Macro camera, 2MP Depth camera and 8MP front camera.

It's available now for a competitive £199.99 from honor.com/uk/shop



The new Honor 90 Smart is priced at £199



# Talking about the weather

THIS striking image by Giulo Montini was amongst last year's winners of the Weather Photographer of the Year competition, organised by the Royal Meteorological Society. The 2024 contest is now open for entries until 18 June, with a top prize of £5,000, plus various category prizes. It is free to enter for professionals and amateurs alike, of all ages.

For full details of the 2024 contest, visit rmets.org/weather-photographer-of-the-year



### Super-cheap f/1.7 portrait lens

VILTROX has announced the AF 56mm F1.7 lens for Fujifilm X and Nikon Z mount (APS-C). Selling for a mere \$139 (about £110), the new lens features 11 lens elements in 9 groups, a 'silent' STM stepper motor and a comparatively light weight of 187g. Available now from viltroxstore.com/products



Viltrox has released an APS-C prime for Fujifilm and Nikon cameras



# Major Panasonic Lumix firmware updates

AMONG the updates for the Lumix S5II and S5IIX full-frame mirrorless cameras are subject detection for people, animals, cars, and motorcycles, plus pre-burst shooting, enabling the camera to continuously buffer frames at 30fps while the shutter button is half-pressed. You can also record a low bit-rate proxy video file simultaneously with a high-quality one. The proxy file can be used during editing to speed up your workflow. See bit.ly/lumixadditions



# More DxO updates

EVER-INDUSTRIOUS French photo-editing specialist DxO has announced its latest batch of updates. Version 7.6 of its PhotoLab software now enables you to apply Digital Camera Profile curves at the start of the raw editing process, increasing the choice of colour options. DxO has also added 15 Cinematic Look-up Tables (LUTs) to the current range in PhotoLab – LUTs enable you to add distinctive colour toning across a range of images, working in a similar way to presets.

'With DxO PhotoLab 7, our goal was to give photographers unprecedented mastery of colour, and version 7.6 reinforces that,' said DxO product manager, Fabrizio Dei Tos.

A special offer is running until 5 May, with the price of DxO PhotoLab 7 Elite reduced to £165, and PhotoLab Essential 7 cut to £99 (DxO doesn't require you to take out a subscription to its software). In addition, DxO's Optics



Dx0 PhotoLab 7.6 in action

Modules, which help to correct lens distortion and aberrations, are now available for the Sony A9 III and Hasselblad 907X CFV 100C cameras, along with an updated range of Nikon, Sigma and Voigtlander lenses. See www.dxo.com

.....

# Exhibit at the RPS HQ

THE ROYAL Photographic Society (RPS) is inviting all photographers to enter the International Photography Exhibition 166. You have until 21 May to send in your entries; submissions are welcome from new, emerging and established photographers at all levels and ages, working in any subject or genre.

Selected photographers will have their work exhibited at the RPS HQ at the Paintworks, south Bristol, and a prize fund will be awarded to support future projects. Entry is free for one image, and up to four images can be submitted for £18 to £30, as a series or as individual images. If you'd like some inspiration, the current edition of the International Photography Exhibition is now on show at the RPS HQ in Bristol, until 2 June. It features 111 works by 50 photographers, exploring environmental issues, identity, community, dementia and grief. Full details of the International Photography Exhibition can be found at rps.org/exhibitions/



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# Workers of

To celebrate 30 years since the publication of Sebastião Salgado's seminal book, *Workers*, **Peter Dench** asks experts in the photography industry what makes the Brazilian photojournalist's work so special

rom 1986-1992, Sebastião Salgado travelled across the globe documenting the end of the first big Industrial Revolution and the demise of manual labour. The result was the classic tome, *Workers: An Archaeology of the Industrial Age.* The book presented six essential chapters: Agriculture, Food, Mining, Industry, Oil and Construction.

The striking black & white images are an eclectic odyssey, from Russian car factories to the beaches of Bangladesh. Collectively, the book delivered a masterclass in photographic technique – content and contrast, lighting and composition. It is testament to the best attributes of the power of photography and what can be achieved through collaboration between subject, sponsor, publisher, editor, colleagues, friends and family.

Thirty years on from its first publication in 1993 and now republished by Taschen, *Workers* still resonates, perhaps more so as the world's population is increasingly sucked into a screen/computer/robot-led existence. To mark the anniversary and the book's republication, we ask leading figures in photography about the significance of *Workers*, Salgado's importance and his influence on their craft, and their favourite of his images from this important book.



Tuna fishing in Trapani, Sicily, Italy, 1991

SEBASTIÃO SALGADO

# the world



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### **Andy Greenacre** Director of Photography, *The Telegraph Magazine /* Telegraph Luxury

'There are a great many photographs by Sebastião Salgado that have attained iconic status within the canon of his works, but from *Workers* I have chosen what might, at first glance, seem a more prosaic image. Shot in 1990 at the Brest military shipyard in France, this picture of a welder, shown above, works on several levels.

'First, the composition and scale is much tighter than many of Salgado's photographs, yet it retains a sense of crackle and drama with him shooting so close to the sparks being thrown off the steel. Second, we are treated to his trademark printing with absolute whites and inky blacks. But what I like most about this picture is the nod to the surrealism in the work of photographers of the 1930s, in particular Cartier-Bresson and Alvarez Bravo. Salgado's low shooting position gives us that eye within an eye, a touch of humour that adds another dimension to the photograph. From record of industry to surrealist fun, this is a great example of Salgado's ability to imbue his works with multiple levels of depth and interpretation.' Welder, military shipyard, Brest, France, 1990

### **Carol Allen-Storey** Award-winning photojournalist chronicling complex humanitarian and social issues

'Sebastião Salgado's style of photography, for me, fosters poetic beauty embracing brutally raw subjects – from poverty through to the oppression of cultures and the impact of industrialisation on the natural landscape. His photographs go beyond language and culture, reaching deep into our souls and challenging us to reflect on the world we live in. They provoke debate and a call to action.

'Salgado said: "I'm not an artist. An artist makes an object. Me, it's not an object, I work in history, I'm a storyteller," and "Photography is a language that is all the more powerful because it can be read anywhere in the world without the need for translation." His exquisitely crafted visuals and personal philosophy have had a profound influence on my brand of photography.'





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### **Nigel Atherton** Editor, *Amateur Photographer*

'There are key moments in all our lives that shape who we are and what we believe in, and one of mine was the day in 1993 that I went to the Royal Festival Hall in London to see Sebastião Salgado's *Workers* exhibition. Oil workers, gold miners, ship-breakers, fishermen, farmers, tea pickers and others were all sympathetically but beautifully photographed like the heroes of an epic visual poem.

'It was my "red pill" moment, showing me for the first time how the comforts that we enjoy are so often built upon the exploitation of some of the world's poorest people. Salgado's next project, *Migrations*, which focused on migrants, refugees and displaced people around the world, many fleeing conflict or natural disasters, was equally powerful and is just as relevant today. His subsequent projects, *Genesis* and *Amazonia*, focused on humanity's relationship with nature and were no less epic in scale and visual impact.

'Choosing just one Salgado image is tough, but I feel I have to go with one of the images that first made my jaw drop all those years ago, from his now-iconic 1986 project on the Serra Pelada gold mine in Brazil. The astonishing sight of 50,000 men digging for gold in the mud of the Amazon, like a scene from Dante's *Inferno*, or the building of the pyramids, is one that has stayed with me. This mine is now closed, but it's a blight on humanity that millions still live similarly wretched lives.'

Above: Serra Pelada gold mine, Brazil, 1986

Right: Zaporizhzhia, Ukraine, 1987



© SEBASTIAO SALGADO/AMAZONAS IMAGES/\*NBPICTURES (WWW.NBPICTURES.COM)



### **Russ O'Connell** Picture Editor, *The Sunday Times Magazine*

'Salgado is one of those rare and prolific photojournalists who documents world events and natural world scenes with an honest yet artistic eye. His monochromatic images often play with scale and perspective in a way that is both intriguing and awe-inspiring. From his iconic images of workers in the burning oil fields of Kuwait, to the majestic tail of a southern right whale in his Genesis works, he never ceases to amaze me with the scope and detail of the work he produces.

'My favourite image of his (see above) is biblical in scale, akin to a scene from an Indiana Jones feature film. It shows a worker in a Brazilian gold mine, standing like Jesus on the cross, while hundreds of other workers scurry up and down primitive ladders like ants carrying earth on their backs. It's hard to believe it is a real scene and not an orchestrated film set, but that's the beauty in Salgado's work; it always leaves you stunned by its undeniable reality.' Above: Serra Pelada gold mine, Brazil, 1986

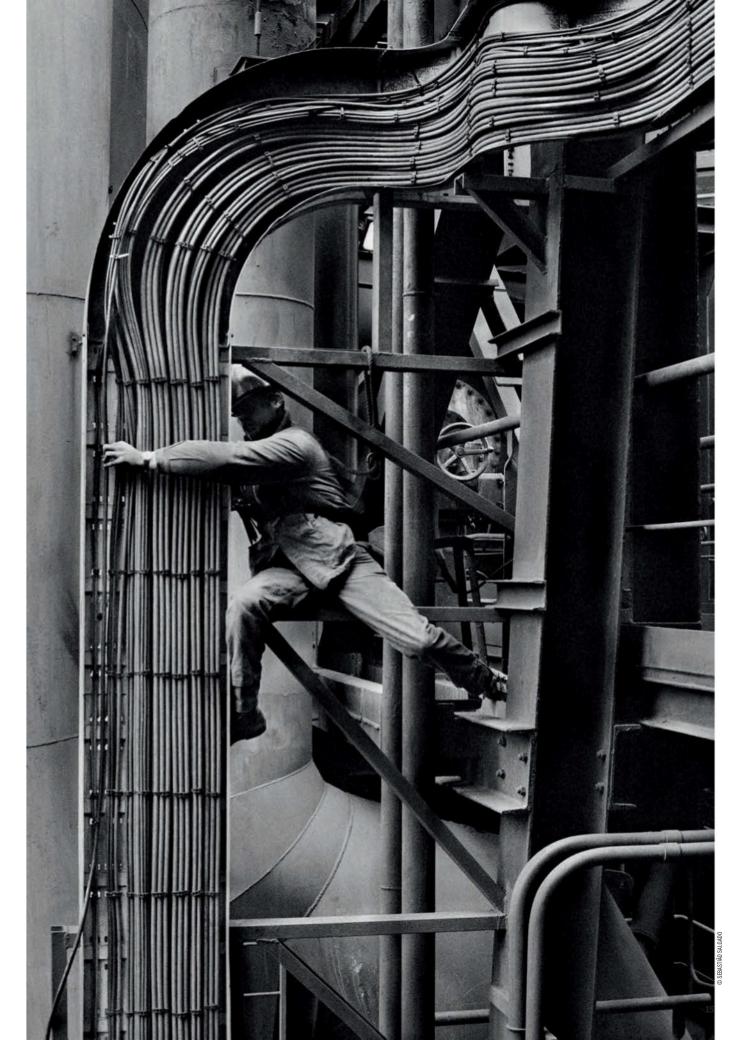
Right: Dunkirk, France, 1987

### **Edmond Terakopian** Photojournalist and commercial photographer, winner of the British Press Awards Photographer of the Year award

'I think most of us can remember the photographs that grabbed us and completely shook us to the core, staying with us for life. Salgado's 'Crucifixion' photograph from the open gold mine at Serra Pelada in Brazil from 1986 (above), is just such an image. It engaged me both emotionally and intellectually.

'The scale of it is immense. It's a photograph that captures a grand vista showing almost ant-like colonies of men in the background, creating a dramatic mosaic of suffering for a meagre wage, yet at the same time juxtaposes an amazing portrait of absolute exhaustion, elegantly, with immense gentleness and empathy. A man broken through a day of hell, all to feed the super-wealthy with their obsession for wanting more and more gold.

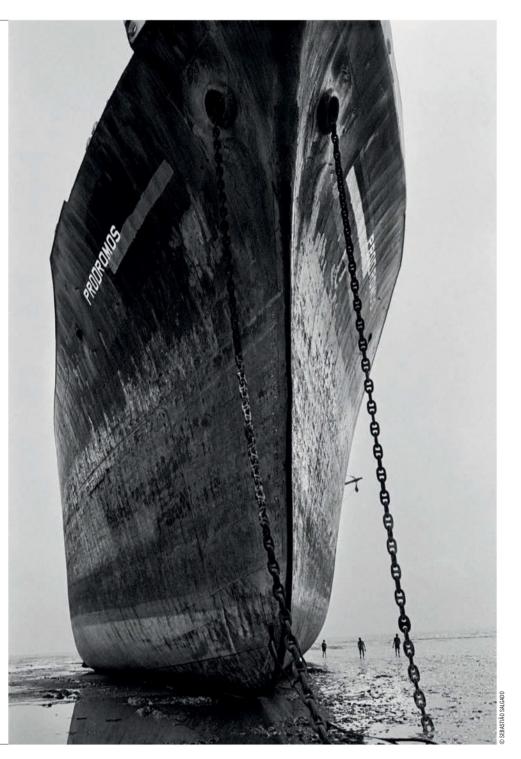
'On a personal level, at the age of 17, a year after starting photography, this image also changed the direction of my life. It opened my eyes to what a camera could produce, when in the hands of a thoughtful, intelligent, empathetic photographer, with immense aesthetic talent. It set me on the path to wanting to be a photojournalist. I could even say that I owe my career to this photograph.'



### **David Collyer FRPS** RPS Documentary Photographer of the Year 2021

'Every artistic genre has its standout practitioners; those who transcend the ordinary or even the extraordinary to become indisputable masters. Sebastião Salgado is one of photography's masters. Not only are his campaigning photojournalism and social documentary work vital in showing the plight of some of the world's most vulnerable and exploited people, but he does so with a consistent technical excellence. Importantly, his work is also visually stunning. Each photograph, a sumptuous feast for the eyes, is an unflinching gaze into the realities of the subject, yet is never done with anything other than respect and empathy for those he portravs.

'Choosing a favourite Salgado image is almost impossible, but I've chosen the photo of the ship Prodromos being broken up in Bangladesh in 1989 (right). The workers are imperative to the shot but dwarfed almost into nonexistence by the looming hulk of the ship; they are vital yet somehow insignificant. The juxtaposition of the might of the vessel and the diminutive, exploited scrap workers is a perfect metaphor for the whole of Salgado's work. It really is a powerful testament to the battle between man and the elements, and the planet and the excesses of man. This shot has everything, yet unlike so much of his work, it's strangely minimal in its composition. The strength of the shot, however, is that because of that sparse presentation, its impact is masterfully maximal. Genius!



#### **Tom Oldham** Photographer, Founder of Creative Corners, AP's Hero of Photography

Corners, AP's Hero of Photography 2023 and Sony Imaging Ambassador 'Describing Salgado's impact on photography is nigh-on

Describing Salgado's impact on photography is high-on impossible as he transcends the form. Us mere pixelpeepers aren't asking what lens or format or megapixels or developer he's using, are we? In no way is this work about the technical (though of course he is a master) – it's so much more about how can anyone capture such magnitude, such incredible enormity whilst retaining that essential relatability necessary for an image to be about humans.

'For me, what Salgado is to photography, The Beatles are to music and Ali is to boxing – you easily forget the medium and focus just on the message. The depth of understanding and pure power in those compositions has created change in us all, and for that the world owes Salgado a colossal debt.' Above: Chittagong, Bangladesh, 1989



### **Ian Berry** Leading British photojournalist and Magnum Photos member since 1962

'The first thing about Sebastião is that he's a great photographer. Secondly, he has a background as an economist working for the World Bank which gave him a wide knowledge of global affairs and conditions. Lastly he's a terrific guy, which is a great combination for a photojournalist/documentary photographer.

'It was on his travels to Africa for the World Bank that he first started seriously taking photographs of the people he met. Then in 1973, he abandoned his career as an economist to concentrate on photography, working initially on news assignments before veering towards the work for which he is well-known. In 1979 he joined Magnum Photos, resigning in 1994 to start his own agency, Amazonas Images, in Paris with his wife Lélia.

'I have sad memories of Magnum board meetings when there were discussions between two distinct sides on the board about where Magnum was going. Sebastião said that if Magnum didn't maintain its editorial outlook he would quit. Things got heated. Sebastião rose, apparently about to depart, when Henri Cartier-Bresson got up and wedged a chair under the doorknob – a symbolic gesture to prevent him leaving. Then things became more peaceable but flared up again at a later board meeting when he rose to explain why he would leave Magnum and was basically ignored. He quit and I drove him to Heathrow to fly back home.

'Although he decided to leave Magnum he has gone on to greater things, producing wonderful books with his capacity to spend years on a project. He is what Magnum should be about and is a great example for any budding photojournalist / documentary photographer.

'Another side to mention is that he is also a passionate believer in preserving the environment. In 1998 his wife Lélia and he created Instituto Terra, an environmental organisation that aims to promote the restoration of the Rio Doce valley. Instituto Terra, besides advocating reforestation, promotes environmental education, scientific research, and sustainable development. For his part he has planted thousands of trees on his organic farm in Brazil.' Above: Coal Mining, Dhanbad, Bihar, India, 1989

### **Tiffany Tangen** Head of Content, Wex Photo Video

'Rembrandt became synonymous with the Golden Age because he was able to paint preternatural light, and for the same reason Sebastião Salgado is synonymous with photography. Spending a lifetime documenting the world in uncontrollable conditions, Salgado is able to see the light, regardless of what's unfolding in front of him; to capture truth and trauma so beautifully is a rarity, and one that allows the audience to connect with a situation more wholly.

'My favourite image from the Workers collection is 'Coal Mining, Dhanbad, Bihar, India, 1989' (above). Salgado encapsulates a sense of individuality against a backdrop of sameness, like ants marching towards summer. His ability to connect you with the subject allows you to see both the solitary man, and the army marching behind. The two perspectives offer an all-encompassing visual story. The ability to document so beautifully, and in such an imagesaturated world, gives scope for the general public to care more, which is something that is entirely welcomed.'



Left: Lada car factory, Tolyatti, Russia, 1991



#### Left: Tea picking at a plantation near Cyangugu, Rwanda, 1991

#### Book Review Workers: An Archaeology of the Industrial Age



Workers is widely recognised as an exploration of the activities that have defined labour from the Stone Age through the Industrial Age to the present. Faithful to the spirit and intent of the original

publication, it pays tribute to the timehonoured tradition of manual labour.

'This book is an homage to workers, a farewell to a world of manual labour that is slowly disappearing and a tribute to those

men and women who still work as they have for centuries,' writes Salgado. His lens elevates the workers to hero or saint. The constant companions of manual labour – poverty, disease, exploitation, injury – are largely ignored. It unapologetically avoids straying from the frontline of the working environment into people's private lives.

That's the Salgado way of taking pictures, to eulogise his subjects and present the best comprehension of human beings and the human condition. To show how the spirit of man prevails in the harshest of conditions. To deliver a message of endurance and hope. Every social documentary photographer and photojournalist has their own eye and a decision to make about what to record and take responsibility for what to leave out, in order to construct a narrative that can effect positive change. Salgado's method provides a valid historical truth within a framework about workers, how the world works and what unites race and nationalities.

'Salgado unveils the pain, the beauty, and the brutality of the world of work on which everything rests,' wrote playwright Arthur Miller on the book's original publication – a description that would be equally valid if written today.

Workers: An Archaeology of the Industrial Age by Sebastião Salgado is published by Taschen, RRP £80. www.taschen.com

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# DIGITAL STARS Fifty quid quality

Early digital cameras can still deliver the goods - and they're becoming collectable too. **John Wade** is your guide

et's start, not with a camera, but with an image. Look at the picture of the cat on this page. Notice how the eyes, the fur, every whisker, every wisp of hair, are all pin-sharp. And rest assured, the quality is retained when this image is interpolated to A4 size. Now consider this. The picture was shot more than 23 years ago with a Nikon Coolpix 880, whose total pixel count was just 3.34MP. Cost then: a little under £700. Value now, fully working with battery and charger: £30-40.

Given this, it's tempting to ponder why you need to invest thousands of pounds on the latest digital gear when it's still possible to get images of this quality from cameras that cost less than  $\pm 50$ . That said, it has to be admitted that today's supersonic, all-singing, all-dancing, whistle-blowing, bell-ringing digital cameras are not merely in a different league to these 50 quid wonders. They are a whole new species.

Stratospheric sums of megapixels, large sensors, mirrorless viewfinders, megaautofocus points, facial recognition, touchscreen operation, a multitude of shooting modes, time-lapse control, voice recording, Bluetooth and Wi-Fi connectivity, text tagging, auto-correct function, best shot selectors, HD video... Be honest – how much of this do you really need?

The fact is, if you are happy to accept a few compromises, you can attain quality images from a small APS-C sensor that uses ten or fewer megapixels; used sensibly, you can make do with only a few autofocus points; and the four basic exposure modes will cover most circumstances.

### CCD versus CMOS sensors

Cameras of this era and price range most likely use charge-coupled device (CCD) sensors rather than the now more accepted complementary metal-oxide semiconductor (CMOS) types, but don't be put off. Although CMOS is preferable for larger format sensors, smaller CCD sensors used in smaller cameras can stand up quality-wise against



Sharp shooting from a 23-year-old 3.34MP Nikon Coolpix 880

CMOS. So what's the difference?

CCD sensors use a lot of energy, resulting in poor battery life and a tendency to heat up quickly. This means only small sensors can deliver live view images to small LCD screens. They also output an analogue signal that is read out relatively slowly, a line of pixels at a time. This signal then has to be converted to digital by an analogue-to-digital converter (ADC) before it can be deciphered by the camera's processor.

Modern CMOS sensors output digital

signals directly. Each column of pixels has its own ADC integrated onto the chip, enabling higher readout speed and lower image noise. CMOS sensors also have a lower power consumption, which means they don't heat up as quickly and battery life is longer.

So yes, CMOS sensors are better. But despite CCDs burning through batteries faster than you might like, with smaller-sensor cameras you won't be disappointed by picture quality at low ISO settings. After all, the Leica M8 and M9 both used CCD

### Testbench **DIGITAL STARS**



More collectable than usable: Minolta Dimage V with its extendable lens (left) and Pentax EI-C90

Sensors. What better recommendation can you have than that?

### The collectability factor

Older digital cameras are suddenly becoming collectable, often because of their strange shapes and weird technologies. In many ways, the dawn of digital was a lot like the early days of film photography when manufacturers experimented with many different shapes and sizes of cameras. Likewise, early digital manufacturers found they could break free from tradition with unconventional designs. For example:

• The Pentax EI-C90, the company's first digital model in 1996, was shaped like a flat box, part of which formed a detachable camera and the other part housing a monitor with a pop-up screen. It's an interesting, and rapidly becoming expensive, collector's item. But with an image size of 0.41MP the EI-C90 is hardly a camera for use.

• Or how about the Minolta Dimage V from 1998, whose manually operated 4.8-13mm zoom lens could be detached from the body and waved about on the end of a 1m long cable to shoot in places other digital cameras might not reach? The image size was a more respectable 3.5MP but it was recorded on SmartMedia cards, making it another one better reserved for the collector's shelf. • In 2002 Sony introduced the Mavica CD400. It was well specified with a Carl Zeiss Vario Sonnar f/2-2.5 3x optical zoom lens, five-area multi-point autofocus, multi-pattern metering, shutter speeds to 1/1,000sec and a 4MP sensor. But it recorded its images on mini compact discs, making it still usable, but not very practical.

 Between 1998 and 2002 Nikon introduced a range of split body cameras in which the part holding the lens swivelled 270° against a main body section that held the LCD screen and main controls. Models included the Coolpix 900, 950, 990 and 4500, the first of which only shot 1.2MP images. But work your way through the range to the Coolpix 4500, and you get a 7.85-32mm f/2.6-5.1 Nikkor lens, 16 scene exposure modes, pop-up flash, macro setting and five-area autofocus, with the camera producing 4MP JPEG or TIFF files. The style was interesting but never went much further. So these cameras are collector's items but with later models teetering on the verge of usability.

# Choosing for using

Although a great many digital cameras costing £50 and less are still usable, there are pitfalls to avoid. The first is that older cameras have a habit of working perfectly right up until the time they don't, and once they're dead, they're dead. So try thoroughly before you buy.

Let's talk megapixels. By today's standards, 5MP seems ridiculously low, with an image

size typically of 2592x1944 pixels. But if all you are going to do is look at your pictures on a computer screen, that'll more than fill a standard Full HD display. If you want to print a 5MP file, you'll get an image of slightly more than 16x21cm at 300dpi, which takes only a little interpolation in Photoshop to get it up to an A4 size of 21x29.7cm.

How about image storage? Early digital camera makers experimented with media of all shapes, sizes and capacities. They included PC cards, 3<sup>1</sup>/<sub>2</sub>in floppy discs, mini compact discs. SmartMedia. CompactFlash. Sony Memory Stick cards, xD Picture Cards, and early versions of the SD cards we still use today. Some of these can still be bought new provided that you invest in a universal card reader, inexpensive and easy to find on eBay, for transferring images to your computer. SD cards or the larger CompactFlash types that preceded them are probably the most practical. Be aware, however, that some older cameras will not operate with cards whose capacities exceed 2GB.

When buying an older digital camera, it's almost inevitable that the charger has been lost. So buy a universal charger, also easy to pick up on eBay where, along with Amazon, replacement batteries can often be found. Many older digital cameras use AA batteries which, coupled with an old CCD sensor, get eaten up very quickly. Rechargeable AA batteries and a charger that handles four at a time are the answer to that.



Storage devices down the digital ages: PC card, floppy disc, mini compact disc, SmartMedia card, Memory Stick card, xD Picture Card, CompactFlash and SD card



All collectable and some usable: Nikon's range of split body cameras

# Cameras to consider

Here's a small selection of early digital cameras, along with brief specs, all capable of delivering the goods for an outlay of  $\pm 50$  or less. Autofocus and a minimum of the usual exposure modes – shutter and aperture priority, program and manual – can be taken for granted on most of the models. Guide prices assume the inclusion of a battery and charger.

### Nikon D70 (2004)

GUIDE PRICE: £40-50

This was the first digital single lens reflex (DSLR) to break the £1,000 barrier. Today, if you search around, you can still find one that just about squeezes under the £50 threshold. Pop-up flashgun, optical reflex viewfinder, 6MP sensor, five autofocus points, 30-1/8,000sec shutter speeds, 1.8in LCD screen, Nikon F lens mount, ISO 200-1600, three JPEG quality levels.

### Nikon Coolpix 880 (2000) GUIDE PRICE: £30-40

Here's a neat little compact camera that is made up of the internal workings of a Coolpix 990 split body model squeezed into a rigid case that measures just 9.5x7x5.5cm. Built-in flashgun, 3.34MP sensor, optical viewfinder, 1.8in LCD screen, three autofocus modes, 38-95mm zoom lens, 8-1/1,000sec shutter speeds, ISO 100-400, records JPEG and TIFF files.

### Canon PowerShot G12 (2010) GUIDE PRICE: £35-45

Chunky is the word for this lovely little camera that's one of the gems in Canon's PowerShot range – and chunky applies to both the body and the intuitively simple-to-use controls. Fully articulated 2.8in screen, 10MP sensor, optical viewfinder, built-in flashgun, ISO 80-3200, 18-140mm zoom lens behind protective cover, 15-1/4,000sec shutter speeds, JPEG or raw files, image stabilisation, face detection, close focus to 1cm.

### Minolta Dimage Z1 (2003) GUIDE PRICE: £20-25

With its unusual round body and attached hand grip, plus a control panel on the back that looks like something from a 1950s science fiction film, this is an early digital camera to appeal to collectors and users alike. Progressive Capture feature that saves Canon PowerShot G12

Nikon D70 (left) and Coolpix 880

Front and back, the futuristic-looking Minolta Dimage Z1

images in the buffer memory when the shutter button is held down, pop-up flash, 3.2MP sensor, 5.8-58mm 10x optical zoom lens, macro shooting down to 50cm, three autofocus modes, three metering options, six subject exposure modes, 4-1/1,000sec shutter speeds, moving mirror reflects LCD image into viewfinder.





Nikon

## Testbench **DIGITAL STARS**



This camera's gimmick is that it uses the third generation of Fujifilm's so-called SuperCCD technology in which pixels are arranged in a 45° honeycomb pattern instead of the conventional square layout. The result is a 3.1MP sensor that is reckoned to produce a 6MP image. Pop-up flash, 7.8-46.8mm zoom lens, electronic viewfinder, 1.8in LCD screen, JPEG and TIFF files, ISO 160-1600, autofocus macro down to 1cm, 15-1/1,000sec shutter speeds.

### **Fujifilm FinePix 6800 Zoom (2001)** GUIDE PRICE: £25-45

Back in the day, Leitz got together with Fujifilm to produce the first consumer Leica-badged digital cameras. Recently, the Leicas have soared in price, while very similar Fujifilm versions like this one have remained relatively inexpensive. Unusual Porsche-designed upright body, pop-up flash, 3.3MP sensor generating a 6MP image, ISO 100-400, 8.3-24.9mm optical zoom lens, optical viewfinder, continuous shooting at 3.3 frames per second for five frames, 2in LCD screen plus circular panel to display camera modes and settings, 3-1/2,000sec shutter speeds.



Above: Two from Fujifilm: FinePix S602 Zoom (left) and the Leica look-alike Finepix 6800 Zoom

Right: Casio Exilim EX-Z77, just one of many similar credit card-size cameras

### **Casio Exilim EX-Z77** (2007) GUIDE PRICE: £20-30

This is just one of a vast range of very similar credit card-size cameras that came from a multitude of manufacturers. It's not for the creative photographer, but at 9.5x6x2cm it's very pocketable and makes an ideal takeanywhere little camera. Built-in flash, 7.2MP (despite for some reason claiming 8.1MP on the front), 4-1/2,000sec shutter speeds, large 2.6in LCD screen, three metering modes, 38-114mm 3x optical and 4x digital zoom, fully auto exposure.



## Conclusion

Cameras like these are still usable and becoming collectable. Buy one for its collectability and you might be agreeably surprised by the image quality. Buy one for its usability and you could discover you've started an unexpected collection.



Left: Fujifilm FinePix S602 Zoom – a reputed 6MP image from a 3.1MP sensor

Right: Nikon D70 – a 6MP image







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### My favourite kit

# Peter Scott

# Wildlife photographer **Peter Scott** reveals his favourite zoom lens to partner up with his trusty Nikon Z 8



Peter Scott has been a photographer for eight years and lives in Dorset. More of his work can be viewed on Twitter @naturehawkphoto and Instagram @naturehawk where he currently has 5.3k followers



### **AP: Tell us a little about your photography background?** PS: I became interested in

photography around 2016 when I enrolled on an Astrophysics and Cosmology course. Having always been fascinated by the night sky, I started to take photos of the moon with a Nikon P900 bridge camera. This then developed into Milky Way images and timelapses after I bought a Nikon D7200. I was soon hooked and began to show an interest in landscape photography. Here in South Dorset we are very lucky to have some of the most incredible locations to capture. There is also an inordinate number of extremely talented photographers in Dorset.

All photography roads for me though inevitably wound up leading to my true passion in life and that is the natural world, especially birds and foxes. I had the most incredibly inspirational primary school teacher (thank you Mr Pinder!) who planted the seed of wildlife wonderment in my young brain and that seed has grown bigger ever since. Now photographing wildlife is my sole focus, and the more isolated from suburbia I am, the happier and more inspired I feel. I have a couple of different fox families that I have been visiting regularly for a number of years. These encounters really do stir the soul, and how anybody can harm these stunning creatures is truly beyond me.

#### AP: If we were to take a look in your camera bag, what would we find?

PS: My camera bag has changed... a lot! I used to take a whole load of gear with me when shooting the night sky or landscapes. Now though I'm very much a travel light advocate. I still have every bit of photographic equipment I'll ever need but I much prefer just to take a Nikon Z 8 body, one lens – either a Nikon 600mm f/4E FL ED VR (with the Artcise AS80C Carbon Fibre Tripod) or Nikon 500mm f/5.6E PF ED VR, a flask of coffee, some batteries and memory cards. Saving that, I have just purchased a floating hide, so that will be getting lots of use in the not-too-distant future.

### AP: Which one item of kit couldn't you live without?

PS: I am torn between the Nikon Z 8 and the 500mm f/5.6 PF lens. I'd probably say the telephoto at a push as it is everything you could want in a lens, but the combination of the two is unbeatable.

### AP: How long have you owned the lens?

PS: I bought the lens new and have had it for two years. I had been using a Sigma 150-600mm before this, which was a very capable lens. However, when the PF came out, I knew that was the lens to suit all my needs. The quality of the images with it were leaps and bounds ahead



of my previous images. I personally think it is fantastic value for money for what it offers but if a new one is out of your price range, there are excellent second-hand deals to be found on camera gear websites for under £2,000! When you consider my 600mm f/4 is £12,000, you can see the value for money.

**AP: Can you elaborate on how you find the lens performs?** PS: Only weighing in at 1.46kg, it is





Nikon's 500mm f/5.6 PF combines fantastic image quality with portability Nikon Z 6, Nikkor 500mm f/5.6 PF, 1/640sec at f/8, ISO 2000

super-lightweight and tiny for such a focal length. Crisp and sharp with excellent build quality, one of the big draws for me is shooting handheld with it because it is so light. Helped by extremely good Vibration Reduction and super-fast autofocus, I tend to use this lens for my fox photoshoots as I'm often laying on the ground with them or crawling into better positions for the light or bokeh. This lens is no barrier to those movements. At 500mm it

Below from left: A fox stalking through a meadow of bluebells; a barn owl at sunset; and a white-tailed eagle



also has great reach, which can be extended with a teleconverter if required.

### AP: Is there a standout photo you've taken using the lens?

PS: One of my favourite images I've taken is one of a vixen on a gorgeous autumn morning. I saw her out hunting on the edge of Poole Harbour in this long, dew-covered grass. This was one of my first fox encounters that really had a profound impact on how I viewed them. She was wet through, muddy but utterly determined to find food. I watched her for about 20 minutes. She saw me but carried on regardless as I just sat in the grass getting soaked. Then I saw her come out of one of the clumps of grass with a vole in her mouth. She trotted purposefully past me and it was only then that I saw a tiny foxcub run up to greet her and gratefully take the catch from her. A truly moving moment on my wildlife journey.

**AP: Have you identified any weaknesses or disadvantages?** PS: All in all, this lens is pretty flawless, especially paired up with

my Z 8. The AF is mind-blowingly good. If you had to bemoan anything, it would be nice to have a longer focal length but that's just wildlife photographers for you. It's also why I bought the 600mm f/4.

### AP: Do you have any plans to replace or upgrade your kit?

PS: I have no plans to upgrade any of my kit now; in fact I'd say I'm now in possession of my dream kit set-up. Especially with having just purchased my Buteo floating hide. I can't wait to use it to try to achieve those water-level images of all manner of birdlife.

#### AP: What do you think your kit will look like in ten years?

PS: If I were a betting man (I'm not), I would guess it would look very similar to how it looks now.



Left: Get an instant quote by visiting the Park Cameras website or you can bring your kit to the store

Below: Securely package the kit you want to trade in or sell, for the courier to collect

Bottom: To show your kit in the best possible light give it a cosmetic clean before you send or take it in

# How to win when trading in

Looking to trade-in or sell a camera or lens? As you'll discover, Park Cameras not only offers great deals on kit but it also makes the whole process hassle-free

ery few 'bad' cameras are released these days, and with some really impressive mirrorless cameras on the shelves, it's no surprise that the pre-owned market in the UK is booming. More and more photographers are choosing to trade-in or sell their existing kit for something new, whether it be a camera, lens or accessory, or simply because they want rid of rarely used gear that somebody else might enjoy.

Park Cameras is one of the UK's leading new and pre-owned photo retailers, and the whole process is

easy and hassle-free. The company offers competitive trade-in or sale prices on a very wide range of kit.

**Great deals start here** You begin by simply visiting the Park Cameras website (**parkcameras.com/trade-in**), where you'll get an instant quote on the camera equipment that you want to trade-in or sell. It's a very painless process, and goes as follows:

• Provide an accurate description of your equipment's condition (Park Cameras provides a simple guide in order to help you).

Describe what accessories it comes with, such as a battery and charger.
Confirm whether or not you have the original box and packaging.
You can also request a quote for multiple items in one go, which is particularly helpful if you're switching camera systems and have numerous bodies or lenses.

There's no need to worry if your kit is slightly more specialist or unusual, either. Park Cameras might need a couple of days to consider what you are looking to trade-in or sell, in order to give you a fair and accurate price.





### Park Points and packaging tips

When adding your details, you can sign-up for a free Park Cameras account. This only takes a moment but makes the process quicker and easier to manage, as you'll be able to track your quote throughout the trade-in or sale process. Plus, should you choose to proceed, you'll start to add 'Park Points' to your account, which can be spent on anything at Park Cameras.

If Park Cameras' offer is accepted and the value of your gear comes to over £300, it will be collected for free via a reliable and secure courier service. A reference will be provided, which ideally should be included within your package, and the driver will bring a label.

All the couriers ask is that your kit is safely and securely packaged, with padding to ensure a safe transit. You don't need to go out and buy expensive packaging materials, however, as bubble wrap, paper or compostable packing chips are ideal. In the past, customers have even



used old clothes to help protect their gear. It's best to avoid using shredded paper, however, as this can get inside the camera if not boxed.

Alternatively, you are welcome to bring your kit to the Park Cameras stores in central London or Burgess Hill, West Sussex (near Brighton).

#### Do a spring clean

In order to get the best possible prices, it's wise to give your kit a cosmetic clean prior to sending it in for inspection. Whilst camera and lens cleaning won't affect the value, it does reflect how gear has been treated and shows your item in the best possible light.

Once received, the expert team at Park Cameras will carefully appraise your kit, sending you an updated quote if necessary. The valuation team, who are all keen photographers themselves, are very fair, and will up the valuation if the condition is better than you described when getting the original quote. This straightforwardness and integrity is backed up by hundreds of reviews on Trustpilot.

If you want to exchange your kit against something new, it's no problem because Park Cameras will sort that out for you, so you get to use the new camera, lens or accessory as quickly as possible. If you'd prefer to be paid in cash, the company will pay this directly into your bank account within three to five days of you confirming you'd like to proceed.

Trading-in or selling your preowned camera kit has never been easier – so what are you waiting for?



# About Park Cameras

Park Cameras is a top independent camera retailer set up over 50 years ago by Reg Atkins, who received numerous accolades from AP. Today, Park Cameras consists of two successful stores, one in West Sussex which doubles as the head office, and the other in central London. There is also a rapidly expanding web and contact centre team based in Burgess Hill, providing the same honest and friendly advice to customers as they get in the stores. Visit **www.parkcameras.com** 







Above: Park Cameras is one of the leading new and pre-owned photography retailers

Left: Gear sent in is carefully checked to ensure that you get a fair quote

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Information design

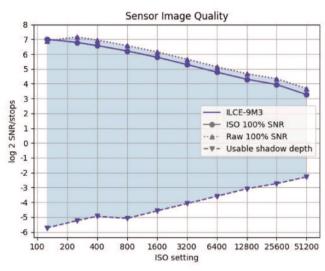
Professor Newman writes about the design of infographics and their use in photography

or a period of my career I worked with a professor of information design, Professor Clive Richards. Information Design covers the production of graphics and other visual presentations to best convey information. With some careful choice of representational forms, complex ideas can be made easier for

people to understand. The outputs from information design are commonly called 'infographics'. In my last article, I introduced a way of estimating image sensor quality and showed how it could be presented as a graph. The graph was produced using some of what I learned of information design (strictly as an amateur). In this article, I'll outline the thinking that lies behind its design.

The first job is to decide in which information would photographers be interested. I decided that there were really two factors of key importance. The first is how noisy images from the sensor would appear, and the second is the available tonal range into the shadows. The former can be measured using a signal-to-noise ratio (SNR), the second with a variant of dynamic range. In both cases to be comparable between cameras the figures need to be normalised to some reference resolution. I chose the resolution required for an A3 print at 360ppi. This is higher than often used, reflecting the desire to produce figures suitable for serious, discerning stills photographers.

The SNR of a digital image changes with the local exposures



### The Sensor Image Quality graph for the Sony Alpha 9 Mark III. An explanation of the meaning of the lines is in the text.

within the image, larger exposures giving higher SNR. The question therefore was to choose a reference level. I chose the exposure that produces a 100% output value at the ISO setting. In a sense the choice is arbitrary, so long as the reference is consistent a higher SNR will always mean a less noisy image. I also chose to plot SNR rather than 'noise' simply because it produces a graph in which higher is better, which makes it easier to understand.

#### **Shadow depth**

The other reason for choosing 100% output value is that it forms a basis for the other measure. I wanted to plot both on the same graph, so that a single graph would provide an easily appreciated indicator of both aspects of 'image quality'. 100% output is the maximum exposure that a photographer will usually get when metering normally, simply because the metering is set up according to the ISO standard. There's often a bit of headroom available in raw files, of which more later.

So the shadow depth line can be plotted relative to the SNR line. The distance between the two lines indicates how many stops are available between 100% exposure and the exposure at which the SNR is two – which is enough to render some tonality in the deepest shadows.

The result is shown in the graph above, providing an at-a-glance indicator of these two factors. In addition the third, dotted line, shows the SNR achieved using the full raw headroom – just for those who prefer a raw workflow, and will meter to make use of it. Improve your photography

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Bob Newman is currently Professor of Computer Science at the University of Wolverhampton. He has been working with the design and development of high-technology equipment for 35 years and two of his products have won innovation awards. Bob is also a camera nut and a keen amateur photographer



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National Maestro winners will also be published on Facebook at the end of June 2024 for the EISA Public's Choice competition. Prize for the winner: €1000.



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# Amateur Photograp Your chance to enter the UK's most prestigious com

# Round two **Animal Kingdom**

This category reflects photographers' appreciation of and love for the animal world. Images of domestic animals are as welcome as wildlife, so whether it's wildebeest in the Serengeti or your dog having a romp in the local woods, we want to see shots celebrating mammals, birds, insects, everything. Try telling the viewer a story about the way a creature lives by showing it in context – be that an urban fox foraging around dustbins, or a seagull stealing chips from a tourist. Or go the other way and fill the frame with the head of a lion...or your pet cat.



### Your guest judge

Your guest judge for Round Two, Animal Kingdom, is one of the UK's leading wildlife photographers, Ben Hall. As someone who previsualises his images, he frequently returns to the same location in an attempt to capture the perfect shot. He's won over 20 awards in the British Wildlife Photography Awards, and has appeared on BBC One's Walk on the Wild Side, The One Show and Countryfile. Visit www.benhallphotography.com

### Plan your APOY 2024 year

Below is a list of all this year's rounds, including when they open, when they close and the dates the results will be announced in AP

22 April <b>20 May</b> 17 June	4 June <b>2 July</b>
	2 July
17 June	
11 30110	30 July
15 July	27 August
12 August	24 September
9 September	22 October
7 October	19 November
4 November	17 December
2 December	14 Jan 2025
	11 Feb 2025
	9 September 7 October 4 November

### YOUR FREE ENTRY CODE

Enter the code below via Photocrowd to get one free entry to Round Two - Animal Kingdom

APOY87776962



### ALL ABOUT APOY 2024

### The camera club award

Do you belong to a camera club? You can accumulate points for your society when you enter APOY, and after all the ten rounds are complete, the club with the most points will win

a superb ViewSonic X1-4K projector worth  $\pounds$ 1,500, with image quality powered by advanced 3rd generation LED technology that offers a 60,000-hour lifespan without lamp replacement. In addition, the member of the winning club who contributed the most points to their club's overall tally will win a ViewSonic ColorPro VP2786-4K monitor worth  $\pounds$ 1,000.



# her of the Year

# petition for amateur photographers





### The Young APOY award

For the fourth time, we are running an APOY Young Photographer of the Year competition, to encourage our up-and-coming snappers. Entrants should be 21 or younger by the competition's final closing date of 31 December 2024. All the categories are the same as for the main contest – simply select the Young APOY option on Photocrowd when you upload your images. Entry is free. Each category winner receives a one-year Adobe Photography Plan subscription, worth £120. The overall Young APOY winner receives a £500 voucher to spend at Camera Centre UK\*.

£17,500

worth of

prizes



In association with

### APOY prizes

The winner of each round of APOY receives a voucher for £500 to spend at Camera Centre UK\*. In addition to this, the winner of each round will also receive a one-year subscription to Adobe's All Apps plan, worth £660. The runner-up of each round will receive a one-year subscription to Adobe's Photography plan, worth £120.

The overall winner after ten rounds wins a  $\pounds$ 1,000 voucher to spend at Camera Centre UK.

### Young APOY prizes

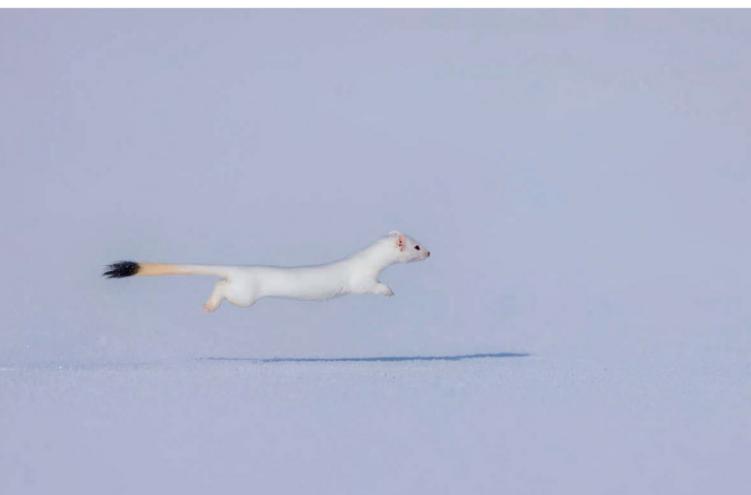
The winner of each round of Young APOY receives a one-year subscription to Adobe's Photography plan, worth £120. The overall winner of Young APOY will receive a £500 voucher to spend at Camera Centre UK\*.

### Camera club prizes

The camera club with the highest number of points after ten rounds will receive a 4K ViewSonic projector worth £1,500, while a ViewSonic monitor worth £1,000 will go to the club member who contributed the most points to the winning club's final points tally.

# **APOY Inspiration**

If you're planning to enter our **Animal Kingdom** round, take these tips from three of last year's top ten photographers



### Steve Santel, California

Canon EOS R5, 600mm, 1/4000sec at f/4.5, ISO 125

Steve came first in last year's wildlife round with this long-hoped-for action photograph. The judges said: 'It's Steve's superb timing skills and anticipation that make this shot a winner.'

Wildlife photography is my passion. I have been extremely blessed to be able to travel far and wide in search of interesting subjects to photograph. One animal that ranked high on my list, but eluded me time and time again, was the long-tailed weasel. I had visited the winter wilderness many times in search of a weasel in its white coat. Finally, on a frigid January day while exploring Yellowstone National Park's interior, I spotted

one pop out of the snow. It darted across the frozen landscape, only to disappear into a hole in the surface. I watched the snow intently in hopes of seeing it reappear. Eventually, the search for food brought it closer to me, and I took advantage of the one and only chance I've ever had to photograph one of these little animals. Handholding a 600mm lens while staring at the super-bright, snow-covered valley, looking for an equally bright, fast-moving subject was challenging. Somehow, I was able to visually lock onto one of its mad dashes, while managing a handful of images before it disappeared into another hole. I didn't see the weasel again, but I'll never forget the experience of watching this tiny predator using all of its resources to survive in an extremely harsh environment."

#### **Richard Coulstock, Edinburgh**

Canon EOS 5D Mark IV, EF 180mm f/3.5L Macro USM, 1/320sec at f/8, ISO 800

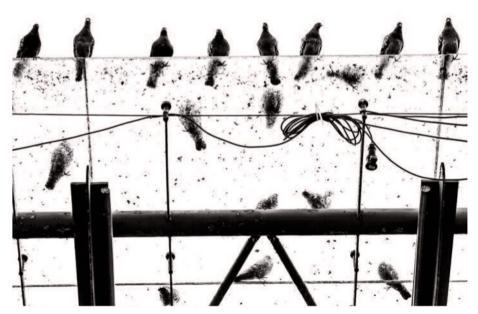
Richard came ninth in last year's round with his image of a green-crested lizard. The judges said: 'The composition is confident, and the judges liked that Richard hadn't felt pressured to include the lizard's whole body in the frame.'

'My image of this green-crested lizard largely came about by accident. I visited the Singapore Botanic Gardens intending to shoot flowers with my Canon 180mm macro lens. However, as I wandered through the Orchid Gardens, I spotted this lizard happily making his way through one of the flower beds. I cursed a little for being ill-equipped, as the 180mm lens is notoriously slow to focus, but thankfully, the lizard paused, and I managed to get a few shots before he headed off again.

'The reddish flowers in the background made a lovely background setting, and the qualities of the lens ended up helping the shot in this regard: the sharpness expected of a macro and the shallow depth of field gave a smooth background. I was lucky with its positioning, the colours in the frame and the fact that there were no foreground distractions. I had time to compose the shot and for the lens to lock focus on the lizard.



'In photography, it often pays to be observant and to be on the lookout for an interesting shot. In addition, a slice of luck never goes amiss. Finally, as we all know, the best camera (or lens!) is the one you have on you!'



#### Graeme Youngson, Aberdeen

Fujifilm X-T5, XF90mmF2 R LM WR, 1/1000sec at f/2, ISO 125 Graeme came second with his unusual perspective on pigeons, and was the top choice of last year's guest judge Keith Wilson: 'The way the lines of the glass panels of the shelter divide the frame symmetrically helps strengthen the overall composition.' I've always been interested in urban pigeons and have been fascinated from a young age by stories of their intelligence and homing abilities (particularly in times of war where their skills and speed were used to great effect as messengers). They divide public opinion but are very much part of our urban lives wherever we are in the world; and are a tricky and fascinating subject to photograph. On the one hand, they are one of the easiest of wild animals to get close to, but on the other they pose a photographic challenge because of their rapid movement and change of direction. Getting them in focus and freezing their action while maintaining a relatively low ISO is a nightmare! It's a real bonus therefore when you can capture them sitting still for a moment.

'Glasgow city centre is always full of pigeons so I had my camera to hand. I'd been taking photos of individual pigeons close up, but switched to a moderate telephoto to try for some shots of them in groups.

'The photo here is of pigeons using the glass shelter at the entrance of a station as a vantage point. Below them is the very busy pedestrian precinct of Argyle Street, where they know that the people sitting on the many benches will drop pieces of food - either accidentally or on purpose - for them. From a photographic point of view, I liked the opportunity to take pigeons from an unusual angle and I loved the way they looked as though they were standing to attention in an almost symmetrical line. I was able to capture this shot before the pigeons swooped downwards seconds later. The glass cover and metal beams contrasted strongly with the outlines of the pigeons to suggest to me that a high-contrast black & white approach might work well.'

#### Technique HOW TO LIGHT ARTWORK





#### Discover the best way to light and shoot paintings, artwork and old prints at home

hether you want to capture a painting, digitise old prints or take on a copy work job, photographing artwork is a useful skill. But there's more to it than

pointing your camera at the canvas. Here we'll look at a host of camera skills that you can use to hone your technique, from lighting and shooting set-ups to cross-polarisation and more.



#### **James Paterson**

James is as skilled a photo editor as he is a photographer. His work has appeared in countless magazines and books, and in 2014 he was appointed editor of Practical Photoshop magazine. Visit www.patersonphotos.com

Camera - A DSLR or mirrorless camera that

Lens - A 50mm prime or longer lens is the best option. We used a 105mm lens. Lights - Two speedlights or strobes are ideal, or strong LEDs, plus two stands and white umbrellas or softboxes.

Tripod - A tripod that lets you swivel the centre column to a horizontal position is helpful to use, as it allows you to shoot downwards without including the tripod legs in the frame.

Tape measure - Useful for matching the height of the painting with the camera. **Circular Polarising Filter and Polarising** sheets - To cut out glare completely by using the cross-polarisation technique.

A camera, tripod and two lights are all you need for polished artwork photos

### A simple lighting set-up at home

Sound lighting is the key ingredient to successful artwork photography. As such we need to control the power, spread and direction of the light so that we can capture paintings and prints evenly, with no glare or reflections. This requires off-camera, manoeuvrable light sources, either flashes or LEDs. Two lights are ideal as we can light the artwork evenly from either side.

The positioning of our lights is crucial. If we use an on-camera light source like a pop-up flash, by firing the light directly at the artwork from the camera position it will bounce straight back at us, and we're likely to see a nasty reflection. Similarly, if the angle of our two lights is too acute (as in, too close to the camera) then – like a pop-up flash – you're likely to see reflections and glare in the artwork, especially if it's behind glass.

Like a snooker ball bouncing off a cushion, light reflects off a surface at the same angle as it is directed at. The angle of incidence is equal to the angle of reflection (sometimes called the glancing angle of incidence). So, if we see glare, the solution is to swing both lights further around to the side so that the light glances off the surface of the artwork at an acute angle, at least 45° or more. This way the reflected glare won't be recorded by the camera.



If the lights are too close to the camera angle, you'll see reflections and glare in the painting. Painting by Bryan Hanlon www.bhbronzes.com



By pushing the lights further around to the side and lighting the painting from a more acute angle, the glare is gone. Painting by Bryan Hanlon www.bhbronzes.com



#### Which lens?

As for lens choice, anything too wide may distort the image so use at least a 50mm focal length, A 100mm lens or anything close to this focal length is ideal, as it will give you enough room to position your lights. Prime lenses tend to be slightly sharper than zooms. All lenses have a sweet spot, an aperture at which they will be sharpest. This varies, but it's usually 2-3 stops down from the max aperture, so for an f/2.8 lens the sweet spot will likely be around f/5.6 to f/8. Whatever lens you use, be sure to use a hood. With the lights at such acute angles there is a chance that light might spill towards the camera. This can cause flare which will wash out the colours and detail. So, use a lens hood or flag the lights to stop the spillage.

#### Technique HOW TO LIGHT ARTWORK



If the lights are too close to the painting, then – especially if it's a larger painting – you might see unwanted fall-off between the edges and centre. The solution is to back the lights up and increase the power for more even, balanced lighting. Painting by Bryan Hanlon (www.bhbronzes.com)

#### Set up the camera

It's best to set manual exposure and either use a light meter or take test shots to nail your exposure. If you're using flashes, make them work for you, rather than adapting to them. In other words, first set your exposure, then tweak your flash power to match it. Here's a stock flash photography setting that works in most situations. Set ISO to 100 for max quality, and aperture f/8, shutter speed 1/200sec, then adjust your flash power (making sure both lights have the same output) until the exposure looks right.

If using constant lighting like LEDs or lamps then set ISO 100 and aperture f/8 and adjust your shutter speed. With these settings you're likely to need a fairly slow shutter speed, which means guarding against camera shake. Use a 2-second timer and – for DSLRs – lock the mirror up before shooting to prevent shake. Turn off any overhead lights to prevent colour casts.



Light modifiers like shoot-through white umbrellas are an inexpensive yet invaluable tool for flash photography, and they can be very helpful when photographing artwork. The larger the light source. the more diffuse the light. By using a white shootthrough umbrella, we can transform the harsh light from the bare flash into something softer and more even. You don't have to use umbrellas or softboxes for copy work, but they can make for more even lighting.

It's also worth thinking about the distance of the lights from the painting. Keep the inverse square law in mind. It states that when the distance between light source and subject is doubled, the subject will receive a quarter of the light. If the light is too close to the painting, then the rate of fall-off will be guicker than if the light is further away, and there may be a noticeable difference in brightness between the edge of the painting and the centre, especially if it's a large painting. If you see this occurring, back the lights off and increase the output so that there's less fall-off. A light meter can be handy for measuring the amount of light in different parts of the artwork.



#### Positioning the camera

We also need to think about camera position. Ideally, we want the camera sensor to be parallel to the artwork, with the lens at the centre point. You can usually get away with eyeballing this, but if you want to be completely accurate, use a tape measure to work out the distance from the floor to the centre of the artwork (if the artwork is on the wall) then set the centre of your lens at exactly the same height. You can also use the tape measure to ensure both your lights are an equal distance from the artwork.

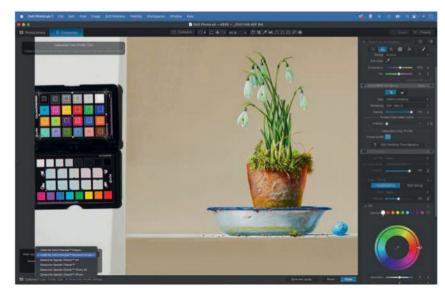
Ensure the verticals in your image are perfectly straight and that your camera height matches the centre point of the painting. Painting by Bryan Hanlon www.bhbronzes.com

#### Get accurate colours

Painters and illustrators choose their colours with great care, so we have a duty to record them as accurately as possible. Accuracy begins with your choice of lighting. Depending on your lights – the brand, model, and power output – there may be subtle differences in the colour output. As such, if you're using two lights then the best approach is to stick to the same brand and model for each. Light can be tinted by modifiers and the surfaces it reflects off, so if possible shoot in a neutral-coloured environment and ensure your umbrellas or other modifiers are neutral. Turn off any artificial lighting or tungsten house lights.



Stick to one brand of lighting like the two Elinchrom flashes in use here, to ensure the colours match



Shoot in raw and take a test shot with a colour reference chart like the ColorChecker Passport. While editing, you can use the chart as a reference to correct the colours in your entire set of photos. DxO PhotoLab 7 has a built-in colour checker tool. Painting by Bryan Hanlon www.bhbronzes.com

#### Use a colour chart

A colour reference chart is essential for precise copy work. The ColorChecker Passport is a popular choice. Take a shot with the reference aid in the frame. We can use the image later to create a custom profile and ensure the colours in the image are as accurate as possible (you should also properly calibrate your monitors using a calibration tool like a Datacolor Spyder). There are several ways you can create a custom profile. I like to use DxO PhotoLab 7, which has an excellent calibration tool built in.

### Eliminate reflections with a polariser

A coat of heavy gloss or a tricky glass surface could mean that, despite all your best efforts with lighting, you might find that the artwork still shows glare or reflections. If so, try using a circular polarising filter. This can help you to reduce reflections and record richer colours.

#### Technique HOW TO LIGHT ARTWORK



#### Cross-polarisation magic

If a single polariser doesn't work, then consider the cross-polarisation technique. For this you need both a polarising filter on your lens and polarised light sources. This could be done by purchasing polarising sheets of film large enough to cover your lights. Tape them to your lights, then ensure there is no other light in the room. By polarising the lights, we filter the random light waves so that the wave form travels in one linear direction. Then by rotating the polarising filter on our camera by 90° we can prevent the reflected linear light waves from entering the camera, thereby completely cutting out all reflections and glare.

Cross-polarisation can be especially useful for dark, glossy or faded paintings, as by reducing all reflections you can often get a clearer image of the brushwork. It also means you don't necessarily need to place your lights at acute angles, so it can be a lifesaver when shooting in tight spaces. You can even get away with using a single light positioned quite close to the camera. Just keep in mind that it's not the best lighting technique for showing textures and ridges in the paint, and you might find the colour accuracy is affected so it's worth using a colour checker chart.



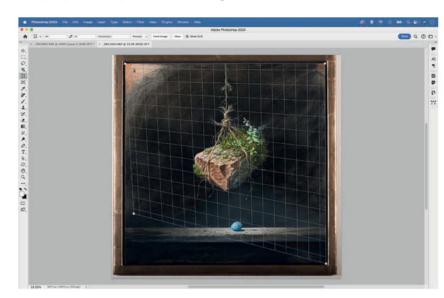
**Cross-polarisation** completely filters out any reflections. Look at how the shiny gold frame goes almost black here when the circular polariser on the lens is rotated to block the polarised light from the flashes. In the cross-polarised version the brushwork becomes clearer and the colours richer. Painting by **Brvan Hanlon** www.bhbronzes.com



#### Photographing old photos

The process for photographing old prints is similar to paintings, but instead set up vertically over the print and place it on the floor or a tabletop. Begin by wiping off any dust or fluff and position your two lights either side of the print at 45° angles. Focus on the print, and zoom in to check focus. If the print is bent or curled then you might need to weigh it down along the edges. Alternatively, if you have a flatbed scanner this could be a better, simpler option.

## Top post-processing tools Here are three useful editing techniques for perfecting your artwork photography...

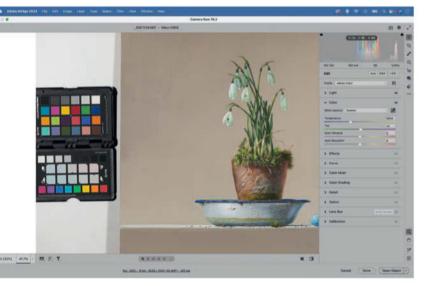


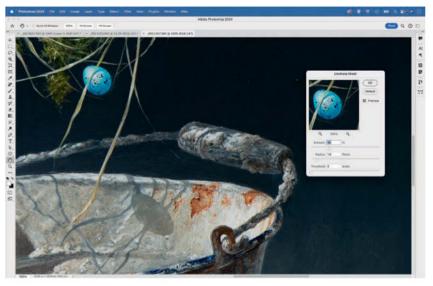
#### Photoshop Perspective Crop

You'll usually need to crop to remove unwanted edges around the frame. While the conventional Crop tool is perfectly fine, the Perspective Crop tool can be a better choice, especially if the frame is slightly wonky or off-centre. Grab the tool and click on the four corners of the artwork to make the crop.

#### Camera Raw / Lightroom White Balance

If you've photographed in raw quality and used a grey card or colour checker chart then you can perfect the white balance with ease. Grab the white balance eyedropper tool in Lightroom/Camera Raw and click on the grey. You can then sync the white balance settings to any other paintings shot under the same conditions.





#### Photoshop Unsharp Mask

A touch of sharpening can help to define the edges of the brushwork. After cropping the image to the size you need to output it at, use Unsharp Masking in Photoshop (Filter> Sharpen>Unsharp Mask) to enhance the fine details.

#### **YOUR LETTERS**

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#### LETTER OF THE WEEK

## Cross signals

I am sure that there are many reasons for people using compact cameras rather than smartphones. Here are my reasons. I spend much of my working time in industrial premises, where there is little access to the internet as signals are blocked by steelwork, machinery, and electrical interference. There is

often Wi-Fi for staff, but not visitors.

I use a compact camera and shoot in raw and JPEG. The camera does not need to access the internet, so the battery and the camera work until I get back to the hotel. However, I did once suffer a memory card failure, and had to use my iPhone. Initially all was well, but the phone wanted to upload images to the cloud. Trying to connect to the internet quickly drained the battery, and the iPhone 'bricked' before lunch time.

Lesson learned, as I now carry a spare compact camera and cards, as well as my phone. Desperate to connect to the internet, the phone limps through a working day, while my compact camera easily lasts the



Wi-Fi and network hassles can make phones less handy for photography, notes reader David

duration. Also, phone signals can be poor, especially outside London. Though I live in UK's second largest urban area, I can't even get a phone signal in my home, except via Wi-Fi. When travelling around the nearby countryside, my iPhone barely functions as a phone, so forget taking pictures. Technology is wonderful, until it stops working. **David Price** 

Perhaps you need a new phone, or at least switch off the cloud uploading when you're out. But you make some good points here, David. Predictions of the death of the compact appear to be premature – just look at the demand for the new Fujifilm X100VI.

Wind SAMUSUNG A Samsung 256GB PRO Ultimate SDXC memory card. The PRO Ultimate card offers read speeds of up to 200MB/s and write speeds of up to 130MB/s. Plus 6 proof technology: Water, Temperature, X-Ray, Magnet, Drop, Wearout & Shock. Limited 10-year warranty. Visit www.samsung.com/uk/memory-storage-devices/

#### It's groans up north

Once more the north/ south debate rears its head and now anything north of the M25 is in another country, it seems! (Viewpoint, 2 April).

So it seems the eight million Londoners don't

like the hour and a half travel time to the NEC, yet people in Manchester happily take the 1h 42m trip to the NEC. I do feel sorry for Londoners.

The Photography Show had one of its highest attendances on the



Monday, which contradicts the idea that the NEC is losing out to visitors from London. My train from Manchester was packed with people going to the NEC. It was well worth going, as the train dropped me at the NEC,



The Photography Show will be alternating between London and Birmingham

under cover, well away from the 'frozen north'.

The statistics used are lies, lies and statistics – look at all the people providing AP with pictures outside the M25. You are ignoring the 54 million people who do not live inside the M25, just so Nigel can say hello to the Excel in London.

London might be the capital, but don't ignore those outside the M25 just because you *think* it's better for the NEC to be nearer London. May I suggest you print AP for the M25 only and see what happens? (I see your offices are outside the M25, enough said). Ignore the millions outside the M25 at your peril! **Graham Burton** 

Thanks for your letter about my Viewpoint, which you may not have spotted was partly tongue in cheek. AP is not The Photography Show, so it wasn't our decision to alternate between London and Birmingham. And we quoted the show's reasons for moving, which have been based on exhibitor feedback. I'm one of the 80% of the AP team who do not live in London. Our online editor is a proud resident of Sheffield and the deputy editor hails from Notts. I just spent the weekend in Leeds at the Photo North festival for which AP was the media partner. But the economic case for The Photography Show's decision is undeniable, and it's not like Birmingham has been abandoned completely.



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Our favourite photos posted by readers on our social media channels this week

## AP picture of the week

#### **Fight Scene** by Lawrence Smith

Canon EOS 1D Mark IV, Canon EF100-400mm f/4.5-5.6 L IS II USM, 1/500sec at f/5.6, ISO 100

'The Falkland Islands are wild and rugged and have myriad wildlife to watch, respect, enjoy and photograph. The location of this image offers opportunities to photograph southern elephant seals, and here, two juveniles are practising their fighting skills, which they'll rely on in adulthood whilst protecting their claimed harem.'

Website: lawrencesmithphotography.co.uk Instagram: @lawrence\_smith\_photography X: @lawsmithphoto

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The AP Pic of the Week winner will receive a beautifully framed print of their winning image worth up to £100. If you Love it, Frame it!



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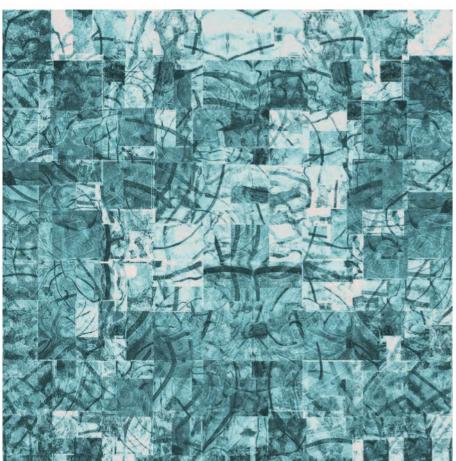
#### **Tranquillità Italiana** by Luis

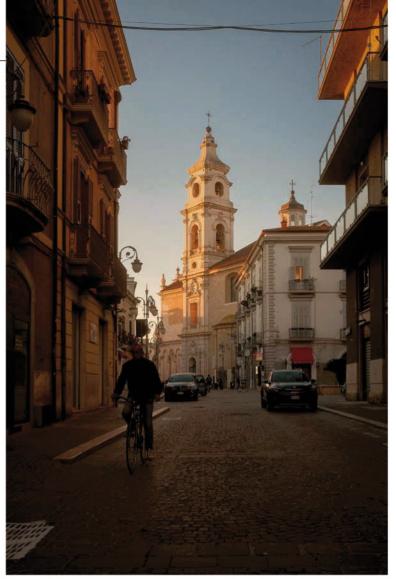
Fujifilm X100V, 1/500sec at f/4.5, ISO 640

'With this photo I want to show you how I see my city in the life of everyday. I want to convey the calm and the beauty through this man riding a bike and the strong light behind him hitting the cathedra!!'

Instagram: @luissphotographer







**Cubist Ice** by Candia Peterson iPhone 15 Pro

'My image is a collage of eight photographs of ice in puddles in the park that I took with my iPhone 15 Pro whilst walking my dogs. I arranged them in a random 4x4 grid, some appearing only once, others more than once and re-oriented. I then sliced that grid into a new 10x10 grid and manually rearranged each of the 100 small squares so that – in theory – no connection of one original edge to another of the same picture remained. I did lose track so not completely sure if I achieved the intent. It is a technique that interests me and one I plan to do more of.' **Instagram: @candiapeterson** 

Want to see your pictures here? Simply share them with our Flickr, Instagram, Twitter, or Facebook communities using the hashtag #appicoftheweek. Or you can email your best shot to us at **ap.ed@kelsey.co.uk**. See page 3 for how to find us.



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# **Reader Portfolio**

#### Spotlight on readers' excellent images and how they captured them



#### Gregor Murphy, Trowbridge

#### About Gregor



Gregor is an audiologist who loves the outdoors as a contrast to his indoor job. He has a pilot licence and

is a member of Devizes Photography Club. See more of his work on Instagram @glidepath1.

#### How did you get into photography?

My aunt had an Olympus Trip camera when I was a child and used to give it to me to take photos. I loved it and became the 'family photographer'. In my teens I saved for a Pentax P30 and went travelling with it, shooting 35mm slides of Nepal, Thailand and Japan.

#### **Favourite subjects**

Apart from travel, I recently started photographing birds and joined a photography course on birds of prey. It's exciting to see what you can capture and affords privileged access to their world – I find it captivating to lie in the grass or sit still waiting for a bird to fly from the trees. You learn about their habitats and appreciate nature with new eyes.

What do you love about photography? It inspires me to get out and

appreciate different places and situations. I like the infinite possibilities with images and admire the skill and effort that goes into a good photograph. The way you can be drawn to an image no matter the genre – if it's a good photo it inspires and captivates.

#### Where do you hope to take your photography?

I would like to do more in-depth astrophotography, as I've just scratched the surface with it. It's challenging in our modern world to get away from light pollution but there are some pristine Dark Sky zones in the UK and indeed overseas in places such as Iceland and Norway. I'd also like to expand my wildlife shots to other animals, from badgers to bears!

#### Current kit

OM-1 (OM Digital Solutions) camera, which is great for my photographic needs. It's versatile, light weight and weather- sealed, which I find works well for wildlife and astrophotography.

#### **Favourite lens**

Olympus 40-150mm F2.8. Pro. I find it sharp throughout the range and again lightweight given its equivalent focal length of 80-300mm. Hawk Owl

**1** The hawk owl was on a fence and I got comfortably close to the bird, shooting at 150mm (300mm cropped). It looks like the bird is in a studio, but it's actually a farm wall painted blue. OM-1, 40-150mm, 1/800sec at f/2.8, ISO 640







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#### Submit your images

See page 3 for details of how to submit. You could see your photos here in a future issue! Please note: the prize is subject to change.

#### **Kestrel Among Red Leaves**

**2** I used spot focus to capture the kestrel with leaves blowing in the foreground. I was pleased to get the eye sharp as the bird didn't hang around long in this position. OM-1, 40-150mm, 1/1250sec at f/4, ISO 320

#### Harris Hawk in Flight

**3** This Harris hawk was playful and 'buzzed us' back and forth across the meadow up to the trees. I was amazed how much open country the birds have at this sanctuary, which is only open to photographers a few times a year. OM-1, 40-150mm, 1/800sec at f/2.8, ISO 1250

#### Harris Hawk Ready for Flight

**4** Taken at the West of England Falconry Centre, I like how the hawk is just about to leave the branch, wings stretched. The OM1's Pro capture function helped catch the image with 'pre shots' stored before the shutter is pressed. OM-1, 40-150mm, 1/800sec at f/3.2, ISO 2000

#### Short-eared Owl

**5** The owl was perched on an old tree stump, while the background was a farm wall with light blue paint and some branches and flowers. I used an aperture of f/2.8 for shallow depth of field and bokeh. 0M-1, 40-150mm, 1/1600sec at f/2.8, ISO 1000



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Our comprehensive listing of key specifications for mirrorless lenses

#### Lenses

Interchangeable lenses come in a huge array of types for shooting different kinds of subjects

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IN GENERAL, the easiest way to expand the kinds of pictures you can take is by buying different types of lenses. For example, telephoto lenses let you zoom in on distant subjects, while macro lenses enable close-ups of small objects. Large-aperture lenses allow you to isolate subjects against blurred backgrounds, or shoot in low light without having to raise the ISO too high. Meanwhile, all-in-one superzooms cover a wide range of subjects, but usually with rather lower optical quality.

#### Lens mounts

On the whole, each manufacturer uses its own proprietary lens mount. Notable exceptions are Micro Four Thirds, shared by Olympus and Panasonic, and the full-frame L-mount that's used by Leica, Panasonic and Sigma.

#### Built-in focus motor

Lenses for mirrorless cameras invariably use built-in motors for autofocus, which are also used for electronic manual focusing. Silent, video-friendly stepper motors are most commonly employed. Manual-focus optics with traditional aperture rings are also widely available.

#### Filter thread

A thread at the front of the camera will have a diameter, in mm, which will allow you to attach a variety of filters or adapters to the lens.

#### Maximum aperture

Wider apertures mean you can use faster, motion-stopping shutter speeds.

#### OUR GUIDE TO THE SUFFIXES USED BY LENS MANUFACTURERS

- AF Nikon AF lenses driven from camera AF-S Nikon lenses with Silent Wave Motor
- AF-P Nikon lenses with stepper motors
- AL Pentax lenses with aspheric elements
- APD Fujifilm lenses with apodisation elements APO Sigma Apochromatic lenses
- **ASPH** Aspherical elements
- Pentax all-weather lenses AW
- Samyang lenses for APS-C cropped sensors CS D
- Nikon lenses that communicate distance info DA Pentax lenses ontimised for APS-C-sized sensors E
- DC Nikon defocus-control portrait lenses
- Sigma's lenses for APS-C digital DC DG Sigma's designation for full-frame lenses
- Di Tamron lenses for full-frame sensors
- Di-II Tamron lenses designed for APS-C DSLRs
- Di-III Tamron lenses for mirrorless cameras
- DN Sigma's lenses for mirrorless cameras
- DO Canon diffractive optical element lenses Sony lenses for APS-C-sized sensors DT
- DX Nikon's lenses for DX-format digital DS Canon's Defocus Smoothing technology
  - Nikon lenses with electronic anertures
    - Sony lenses for APS-C mirrorless

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- ED Extra-low Dispersion elements
- Canon's lenses for full-frame DSLRs EF-S Canon's lenses for APS-C DSLRs
- **EF-M** Canon's lenses for APS-C mirrorless
- EX Sigma's 'Excellent' range
- FA Pentax full-frame lenses

FF

- FE Sony lenses for full-frame mirrorless
- Nikon lenses without an aperture ring G
- HSM Sigma's Hypersonic Motor Canon's Image-Stabilised lenses IS
- L Canon's 'Luxury' range of high-end lenses Low-Dispersion glass LD
- LM Fuiifilm Linear Motor
- MP-E Canon's high-magnification macro lens
- **OIS** Optical Image Stabilisation
- OS Sigma's Optically Stabilised lenses PC-E Nikon tilt-and-shift lenses
- Nikon Phase Fresnel ontics
- PZD Tamron Piezo Drive focus motor
- Canon full-frame mirrorless lenses RF
- Nikon's premium lenses for mirrorless SAM Sony Smooth Autofocus Motor
- SDM Pentax's Sonic Direct Drive Motor
- SMC Pentax Super Multi Coating

- SP Tamron's Super Performance range
- SSM Sony Supersonic Motor lenses STF Sony and Laowa Smooth Trans Focus
- STM Canon lenses with stepper motor
- TS-E Canon Tilt-and-Shift lens
- UMC Ultra Multi Coated
- USM Canon lenses with an Ultrasonic Motor USD Tamron Ultrasonic Drive motor
- VC Tamron's Vibration Compensation
- Nikon's Vibration Reduction feature VR
- WR Weather Resistant
- Nikon's lenses for mirrorless cameras Ζ

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Mirrorless	Le	Ĩ	ISES	IMAGE Stabilisation	CANON M	CANON RF Micro 4 thirds	SONY E Nikon 7	FUJIFILM X	LEICA L	MIN FOCUS (CM)	FLUTER TH READ (MM	DIAMETER (MM)	LENGTH (MM) Weight (G)
LENS	RRP	SCOR	SUMMARY		8	3 1	S I		98				≝ ⊯ IENSIONS
CANON MIRRORLESS													
RF-S 10-18mm f/4.5-6.3 IS STM	£379		Extremely small and lightweight ultra-wide zoom for Canon's APS-C format EOS R mirrorless models	•		•				14	49	69	44.9 150
RF-S 18-45mm f/4.5-6.3 IS STM	£319		Retracting kit zoom designed for the EOS R10; small and lightweight, but offers an uninspiring range	•		•				20	49		44.3 130
RF-S 18-150mm f/3.5-6.3 IS STM RF-S 55-210mm f/5-7.1 IS STM	£519 £429		General-purpose travel zoom lens for APS-C format RF-mount cameras such as the EOS R7, R10 and R50 Lightweight telephoto zoom for APS-C RF-mount cameras, with decidedly slow maximum aperture			•				17 73	55 55	69 69	84.5 310 135 270
RF 10-20mm f/4 L IS STM	£2580		World's widest-angle full-frame rectilinear zoom includes optical stabilisation and weather-sealing			•			•	25	n/a	83.7	112 570
RF 14-35mm f/4L IS USM	£1750		High-spec, relatively lightweight ultra-wide zoom that offers 5.5 stops of stabilisation and takes 77mm filters	•		•			•	20	77		99.8 540
RF 15-30mm f/4.5-6.3 IS STM RF 15-35mm f/2.8L IS USM	£669 £2330		Relatively affordable, compact, and lightweight image-stabilised ultra-wideangle zoom Premium f/2.8 optic with unusually wide maximum angle of view and optical image stabilisation			•				28 28	67 82		88.4 390 126.8 840
RF 16mm f/2.8 STM	£320		Small, lightweight ultra-wideangle prime is affordable but has seriously compromised optics			•			•	13	43		40.1 165
RF 24mm f/1.8 IS STM Macro			Bright wideangle prime with optical stabilisation and close focusing that gives half life-size magnification	•		•			•	14	52		63.1 270
RF 24-50mm f/4.5-6.3 IS STM RF 24-70mm f/2.8L IS USM	£379 £2330		Compact, retractable full-frame kit zoom designed for the EOS R8 Image-stabilised, large-aperture, standard zoom for Canon's full-frame mirrorless EOS R system			•				30 38	58 82	69.6 88.5	58 210 127.7 900
RF 24-105mm f/4L IS STM	£1120		General-purpose standard zoom with useful range and image stabilisation							45	62 77		107.3 700
RF 24-105mm f/4-7.1 IS STM			Designed to be an ultra-compact and lightweight kit zoom, with an unusual 'Centre Focus Macro' option	•		•			·	34	67		88.8 395
RF 24-240mm f/4-6.3 IS USM	£800 £345	4★	Very respectable all-in-one travel zoom with fast AF and effective IS that's well-matched to the EOS RP	•						50 23	72 55		
RF 28mm f/2.8 STM RF 28-70mm f/2L USM	£345 £3050		Slimline, lightweight 'pancake' prime that's equally well suited to APS-C and full-frame cameras Groundbreaking, but huge, full-frame zoom with constant f/2 maximum aperture							39			24.7 120 139.8 1430
RF 35mm f/1.8 IS STM Macro	£520		Multi-purpose fast prime that includes image stabilisation and 0.5x macro reproduction			•			•	17	52		62.8 305
RF 50mm f/1.8 STM RF 50mm f/1.21 USM	£220 £2350	4.5★	Compact, lightweight standard prime uses new mirrorless-optimised optics, including an aspherical element			•				30 80	43	69.2 89.8	40.5 160
RF 50mm f/1.2L USM RF 70-200mm f/2.8L IS USM	£2350 £2700	5★	Heavyweight ultra-fast standard prime that promises exceptional low-light performance High-end constant maximum aperture telephoto zoom with unconventional extending barrel design							80	77 77	89.8 89.9	108 950 146 1070
RF 70-200mm f/4L IS USM	£1700		Small and light weather-sealed telephoto zoom promises premium optics	•		•			•	60	77		119 695
RF 85mm f/1.2L USM	£2800		Top-of-the-line, ultra-large aperture, short telephoto portrait prime for full-frame mirrorless			•			•	85			117.3 1195 117.3 1195
RF 85mm f/1.2L USM DS RF 85mm f/2 Macro IS STM	£3250 £650		Alternative version of the 85mm f/1.2 that includes special coatings for a Defocus Smoothing effect Relatively compact, lightweight image-stabilised short-telephoto that offers half life-size magnification							85 35	82 67	103.2 78	91 500
RF 100mm f/2.8 L Macro IS USM	£1480	5★	Superb macro lens with 1.4x magnification and spherical aberration control dial for smoothing blur	•					•	26	67	81.5	148 730
RF 100-400mm f/5.6-8 IS USM	£700		Long telephoto zoom that's surprisingly compact, lightweight and affordable due to its small aperture	•		•			·	88	67		
RF 100-500mm f/4.5-7.1L IS USM RF 135mm f/1.8 L IS USM	£2900 £2560	4.5★	Premium ultra-telephoto zoom that's barely any larger than its 100-400mm DSLR counterpart High-end large-aperture portrait prime boasting optical stabilisation and weather-sealed construction			•				90 70	77 82	94 89.2	208 1530 130.3 935
RF 200-800mm f/6.3-9 IS STM	£2300		Ultra-telephoto zoom for full-frame cameras with weather-sealing and relatively manageable size	•		•			•	80			314.1 2050
RF 600mm f/11 IS STM	£700		Remarkable lightweight ultra-telephoto that employs diffractive optics and a collapsible barrel	•		•			·	450		93	200 930
RF 800mm f/11 IS STM	£930		Similar design to its 600mm sibling makes it easily the smallest and most affordable 800mm prime			•			•	600	95	102	282 1260
FUJIFILM MIRRORLESS	6700		E des states et an et des suistent altre aide suite sins accests 20 au 20 au					-		10	<u>co</u>	<u> </u>	50.0 045
XF 8mm F3.5 R WR XF 8-16mm f/2.8 R LM WR	£799 £1799		Extremely compact, weather-resistant, ultra-wideangle prime, accepts 62mm filters Premium ultra-wideangle large-aperture zoom lens with weather-resistant construction							18 25	62 n/a		52.8 215 121.5 805
XF 10-24mm f/4 R OIS WR		4.5★	Updated wideangle zoom lens with weather resistance and improved stabilisation that gives fine results							24	72	77.6	87 385
XF 14mm f/2.8 R		5★	Wideangle prime with high resolution into the corners, its performance justifies the price tag					•		18	58		58.4 235
XC 15-45mm f/3.5-5.6 OIS PZ XF 16mm f/1.4 R WR	£259 £729	5+	Lightweight retractable power zoom that's set to be the entry-level kit lens for X-system cameras Weather-sealed fast prime for X-system users							13 15	52 67	62.6 73.4	44.2 135 73 375
XF 16mm f/2.8 R WR			Attractively priced, weather-sealed, compact and lightweight wideangle prime							17	49		45.4 155
XC 16-50 f/3.5-5.6 OIS II	£359		Lightweight lens for mirrorless X-series offers 24-75mm equivalent zoom range	•				•		30	58		98.3 195
XF 16-55mm f/2.8 R LM WR XF 16-80mm f/4 R WR OIS	£899 £769		A flagship XF standard zoom lens with a constant f/2.8 aperture and weather-resistance Good-quality weather-sealed, constant maximum aperture zoom with a useful focal-length range							60 35	77 72	83.3 78.3	106 655 88.9 440
XF 18 comm // 4 R UN VIS	£879		Large-aperture wideangle prime with weather-resistant construction					•		20	62		75.6 370
XF 18mm f/2 R	£430	4★	A compact wideangle lens with a quick aperture					•		18	52		40.6 116
XF 18-55mm f/2.8-4 R LM OIS XF 18-120mm f/4 LM PZ WR	£599	3 5 🛨	Short zoom lens with optical image stabilisation Optimised for both video and stills use, with a power zoom mechanism that operates internally	•						18 60	58 72	65 77 3	70.4 310 123.5 460
XF 18-120mm 1/4 LW F2 WK XF 18-135mm f/3.5-5.6 R LM OIS WR		5.5★ 4★	Weather-resistant zoom for Fujifilm X mount, designed to be the perfect partner for Fujifilm X-T series camera	s ·						45	77		97.8 490
XF 23mm f/1.4 R	£649		Premium wideangle prime lens with fast maximum aperture					•		28	62	72	63 300
XF 23mm f/1.4 R LM WR XF 23mm f/2 R WR	£819 £419		Replaces the older XF 23mm f/1.4 with updated optics, faster autofocus and a weather-resistant design Compact weather-resistant wideangle prime lens							19 22	58 43	67 60	77.8 375 51.9 180
XF 25mm 1/2 K WK XF 27mm f/2.8 R WR			Slimline, lightweight pancake prime with aperture ring and weather-resistant construction							34	45 39	62	23 84
XF 30mm f/2.8 R LM WR Macro	£599		Relatively compact and affordable macro lens offering internal focus and 1:1 magnification					•		10	43	60	69.5 195
XF 33mm f/1.4 R LM WR XF 35mm f/1.4 R	£619 £439	1+	Designed to complement the smaller, cheaper 35mm f/1.4, with quicker autofocus and weather-sealing Shallow depth of field and bokeh effects are simple to achieve with this lens					•		30	58 52	67 65	73.5 360
XF 35mm f/1.4 k XF 35mm f/2 R WR	£439 £299		A powerful and weather-resistant lens that feels great and has the performance to match							28 35	52 43	60 60	54.9 187 45.9 170
XC 35mm f/2	£169		Simplified version of the 35mm f/2, with plastic construction and no weather-sealing or aperture ring					•		35	43	58.4	46.5 130
XF 50mm f/1 R WR	£1499	5+	The world's fastest autofocus lens promises to be a very special optic for portrait photography					•		70	77		103.5 845
XF 50mm f/2 R WR XF 50-140mm f/2.8 R LM OIS WR	£449 £1249	ງ 🗶	Lightweight weather-resistant short telephoto prime lens that's ideal for shooting portraits A telephoto zoom with a constant maximum aperture and weather-resistance							39 100	46 72		59.4 200 175.9 995
XC 50-230mm f/4.5-6.7 OIS II	£315		The XC lens range is designed to suit Fuji's mid-range CSCs, and this lens has optical image stabilisation	•				•		110	58	69.5	111 375
XF 55-200mm f/3.5-4.8 R LM OIS	£599		Telephoto with built-in optical image stabilisation plus aperture control ring	•				•		110		75	118 580
XF 56mm f/1.2 R XF 56mm f/1.2 R APD	£899 £1159		This wide-aperture portrait lens for X-series cameras has great sharpness and detail and is great value Adds apodisation element of 56mm f/1.2 for even more attractive background blur							70 70	62 62	73.2 73.2	69.7 405 69.7 405
XF 56mm f/1.2 R WR	£999		Large-aperture short-telephoto portrait prime with high quality optics and weather-sealing					•		50	67	79.4	76 454
XF 60mm f/2.4 XF R Macro	£599		A short lens designed for macro work with half-life-size magnification					•		26.7	39	64.1	70.9 215
XF 70-300mm f/4-5.6 R LM OIS WR XF 80mm f/2.8 R LM OIS WR Macro	£729 £1249	4+	Lightweight weather-sealed telezoom that's compatible with 1.4x and 2x teleconverters for greater reach Fujifilm's long-awaited 1:1 macro includes weather-resistance and optical image stabilisation							83 25	67 62	75 80	132.5 580 130 750
XF 90mm f/2 R LM WR	£699	5★	A classic portrait lens that's sharp, with gorgeous bokeh					•		60	62	75	105 540
XF 100-400mm f/4.5-5.6 R LM OIS WR	£1399		This superb zoom is both water and dust resistant, and can operate in -10°C temperatures	•				•		175	77		210.5 1375
XF 150-600mm f/5.6-8 R LM OIS WR	£1899	4.5★	Long telephoto zoom that employs a small maximum aperture to keep the size and weight low	ŀ			1	Ŀ		240	82	99	314.5 1605

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#### **BUYING GUIDE**

Mirrorless				NAGE	CANON M	CANON RF	MICRO 4 THIRDS Somy F	NIKON Z	FUJIFILM X	LEICA L FIIII FRAMF	MIN FOCUS (CM)	FILTER TH READ (MN	DIAMETER (MN	(WW) HLONOT
LENS	RRP	SCOF	E SUMMARY			3		DUNT				Ī		MENS
LAOWA MIRRORLESS														
	0510		Wideet and a restilinger loss qualible for Migra Faur Thirds services and still service by an								0	EO	C1	50
6mm F2 Zero-D MFT 7.5mm f/2 MFT	£519	4.5★	Widest-angle rectilinear lens available for Micro Four Thirds cameras, yet still remarkably small Tiny but sharp wideangle prime for Micro Four Thirds featuring manual focus and aperture control								9 12	58 46	61 50	52 55
10mm f/2 Zero-D MFT	£499 £399		Tiny, sharp wide prime for Micro Four Thirds with manual focus and auto aperture control from the camera								12	40	54	41
17mm f/1.8 MFT	£189	4.J 🗙	Inexpensive compact prime for Micro Four Thirds with manual focus and auto aperture control from the camera Inexpensive compact prime for Micro Four Thirds cameras with manual focus and aperture operation							-	12		55	50
18mm f/0.95 APO MFT Argus	£519		Ultra-large aperture, manual focus prime, designed for Micro Four Thirds only								20	62	80	83
25mm f/0.95 APO MFT Argus	£399		Manual-focus standard prime for Micro Four Thirds with ultra-large aperture at an affordable price								25		71	86
50mm f/2.8 2x Ultra Macro APO MFT	£409		Manual locus standard prime for micro roan rinks with didarlarge aperture at an anorable price Macro lens for Micro Four Thirds with manual focus, electronic aperture setting and 2x magnification								13.6		53.5	
4mm f/2.8 Fisheye	£249		Lightweight fisheye lens for APS-C and Micro Four Thirds offering a circular image with a 210° angle of view								8	n/a		
8-16mm f/3.5-5 CF	£579		Ultra-wideangle zoom for APS-C cameras provides 12-24mm equivalent view at an affordable price								20	86	88.4	88.5
9mm f/2.8 Zero-D	£499		Compact manual-focus prime for APS-C mirrorless cameras promises very low distortion								12		60	53
10mm f/4 Cookie	£339	4★	Slim, lightweight and affordable ultra-wideangle prime for APS-C offers decent optics			•		×.	•		10	37	59.8	
25mm f/0.95 CF APO Argus	£649		Ultra-large aperture lens for APS-C cameras with manual focus and aperture control		•	•			•		34	62	71.5	
33mm f/0.95 CF APO Argus	£499		Ultra-fast manual-focus standard prime for APS-C cameras that promises minimal colour fringing			•		1.1	•		35	62	71.5	83
65mm f/2.8 2x Ultra Macro		4.5★	Superb manual-focus macro lens that provides unusually high 2x magnification		•				•	•	17	52	57	100
9mm f/5.6 FF RL	£869		The world's widest full-frame rectilinear lens is also available in Leica M mount					•		· ·	12	n/a		66
10mm f/2.8 Zero-D FF	£839		Ultra-wideangle prime for full-frame cameras; Laowa's first autofocus lens in its E and Z-mount versions			•	•	·		• •	12	77	82	70.8
10-18mm f/4.5-5.6	£899		The world's widest zoom for full-frame mirrorless cameras, with manual focus and aperture control			•	•	· ·		· ·	15	37	70	90.9
11mm f/4.5 FF RL	£769		Compact, lightweight ultra-wideangle rectilinear prime for full-frame mirrorless accepts 62mm filters				•	•		• •	19	62	63.5	58
12-24mm f/5.6 FF	£729		Remarkably small and light ultra-wideangle zoom with manual focus and aperture control			•		· ·		•	15	77	69.4	93.6
14mm f/4 FF RL	£599		Smallest of a trio of manual-focus ultra-wideangle rectilinear RL primes for full-frame mirrorless			•		· ·		• •	27	52	58	59
15mm f/2 Zero D	£899		Manual-focus fast ultra-wideangle prime for full-frame mirrorless cameras, with minimal distortion			÷.	•	· ·		• •	15	72	66	82
15mm f/4.5 Zero-D Shift	£1249	4★	The world's widest-angle shift lens offers +/-11mm movement in any direction			•	•	· ·		•	20	n/a	79	103
20mm f/4 Zero-D Shift	£1139		Wideangle shift lens that offers +/-11mm movement and promises zero distortion			÷.				· ·	25	82	91	95
28mm f/1.2 FF Argus	£669		Manual-focus large-aperture wideangle prime for full-frame mirrorless cameras			•	•	•		• •	50	62	68.5	
35mm f/0.95 FF Argus	£899		Ultra-large aperture manual-focus lens for full-frame mirrorless cameras			÷		•		•	50	72	76.8	
45mm f/0.95 FF Argus	£869		Manual-focus prime lens with an ultra-large maximum aperture, that promises a natural-looking perspective			•	•	•		•	50	72	76.8	
58mm f/2.8 2x Ultra Macro APO	£539		Specially designed for full-frame mirrorless, this manual focus lens provides 2x magnification			·		•		· ·	10.0		74	117
85mm f/5.6 2x Ultra Macro APO	£449	4.5★	Remarkably small and lightweight full-frame macro lens that delivers twice life-size magnification			•	•	•		•			53	81
90mm f/2.8 2x Ultra Macro APO	£539		Fully manual macro lens offering twice life-size magnification, designed for full-frame mirrorless			÷		÷		• •	20.5	67	74	120
LEICA MIRRORLESS														
14-24mm f/2.8 Vario-Elmarit-SL Asph	£2220		Ultra-wideangle zoom for Leica's SL full-frame cameras with a large maximum aperture								28	n/a	85	131
24-70mm f/2.8 Vario-Elmait-SL Asph	£2300		Large aperture standard zoom lens for Leica's full-frame mirrorless cameras									82	88	123
35mm f/2 Summicron-SL Asph	£1950		Relatively small and affordable by Leica's standards. Not to be confused with much pricier 35mm f/2 APO								24	67	74.5	
50mm f/2 Summicron-SL Asph	£1700		Leica's least expensive full-frame L-mount lens is half the weight of the premium APO alternative								_	67	74.5	
100-400mm f/5-6.3 Vario-Elmar-SL	£1910		Weather-sealed and optically stabilised long telephoto zoom, compatible with 1.4x teleconverter	•						• •	110		198	88
NIKON MIRRORLESS														
12-28mm f/3.5-5.6 PZ VR Nikkor Z DX	£379	45+	Ultra-wideangle lens for Nikon DX-format cameras with power zoom operation								19	67	72	63.5
16-50mm f/3.5-6.3 VR Nikkor Z DX	£329	4.3 🔨	Extremely compact and lightweight retractable kit zoom for Nikon's DX-format mirrorless								30		70	32
18-140mm f/3.5-5.6 VR Nikkor Z DX	£599	1+									20		73	90
24mm f/1.7 Nikkor Z DX			Small and light all-in-one travel zoom for DX mirrorless cameras, with impressive close-focus capability Compact, lightweight and affordable large-aperture prime for DX-format cameras								18		70	40
50-250mm f/4.5-6.3 VR Nikkor Z DX			Entry-level telephoto zoom for DX mirrorless featuring retractable barrel design								100		74	110
14-24mm f/2.8 S Nikkor Z	£2499		Pro-spec weather-sealed wideangle zoom that can use 112mm filters via the included hood								28			
14-30mm f/4 S Nikkor Z			Remarkably compact ultra-wideangle zoom that accepts 82mm screw-in filters								28	82	89	85
17-28mm f/2.8 Nikkor Z			Smaller and more affordable large-aperture ultra-wide alternative to the 14-24mm f/2.8					•			19	67	75	101
20mm f/1.8 S Nikkor Z	£1049		Weather-sealed large maximum-aperture prime promises ultra-sharp images								20	77	84.5	
24-50mm f/4-6.3 Nikkor Z	£439		Ultra-compact and lightweight zoom designed to be sold with the entry-level Nikon Z 5								35		73.5	
24-70mm f/2.8 S Nikkor Z	£2199	5★	Superb fast standard zoom includes OLED display and customisable control dial					×.			_		89	126
24-70mm f/4 S Nikkor Z	£999		General-purpose standard zoom for Nikon's full-frame mirrorless system					•					77.5	
24-120mm f/4 S Nikkor Z		4.5★	Standard zoom for Z-system cameras with extremely useful focal-length range								35		84	118
24-200mm f/4-6.3 VR Nikkor Z			Billed as the perfect ultra-compact travel zoom lens, with dust- and drip-resistant construction	•				•			70			
24mm f/1.8 S Nikkor Z	£1049		Large-aperture wideangle prime that aims to combine edge-to-edge sharpness with attractive bokeh					•			25		78	96.5
26mm f/2.8 Nikkor Z	£529		Ultra-compact 'pancake' lens, designed for full-frame but also a good fit to DX-format cameras					•			20			23.5
28mm f/2.8 Nikkor Z	£249		Inexpensive, compact full-frame prime, also available as an SE version in a kit with the Z fc					•		•	19		70	43
28-75mm f/2.8 Nikkor Z	£949	4★	Large-aperture standard zoom that's much more compact and affordable than its 24-70mm f/2.8 sibling					•			19		75	120.
28-400mm f/4-8 VR Nikkor Z	£1400		Longest-range superzoom lens for full-frame cameras, includes weather sealing and optical stabilisation	•				•		•	20			141.
35mm f/1.8 S Nikkor Z	£849		Fast, moderate-wideangle prime designed for optimum optical performance					•		•	25			86
40mm f/2 Nikkor Z	£249	4.5★	Small, lightweight and affordable standard prime that focuses fast and gives decent image quality					•		•	29		70	45.5
50mm f/1.2 S Nikkor Z	£2299		Ultra-large aperture weather-sealed standard prime that promises 'elaborate bokeh'					•		•	45			
50mm f/1.8 S Nikkor Z	£599		Large-aperture prime that promises exceptional edge-to-edge sharpness					•		•	40		76	86.5
50mm f/2.8 MC Nikkor Z	£649		Compact, lightweight and relatively affordable macro lens that offers 1:1 magnification					•		•	16			
70-180mm f/2.8 Nikkor Z	£1299	4.5★	Relatively small and lightweight alternative to the Z 70-200mm f/2.8 that's also much more affordable				1	•		•	27	67	83.5	
70-200mm f/2.8 VR S Nikkor Z	£2399		Pro-spec large-aperture telezoom with optical image stabilisation and built-in OLED display	•				· ·		•	100			220
85mm f/1.8 S Nikkor Z	£799	4.5★	Portrait prime for Nikon's full-frame mirrorless system that promises beautiful bokeh					•		•	80		75	99
85mm f/1.2 S Nikkor Z	£2999		Pro-spec ultra-large-aperture short telephoto prime designed for portrait photography					· ·		•	85		102.5	
100-400mm f/4.5-5.6 Nikkor Z VR S	£2699		Optically-stabilised pro-level telephoto zoom includes top-plate status panel and weather-sealed build	•				•			75		98	222
105mm f/2.8 VR S MC Nikkor Z	£999		Professional-spec macro lens that boasts optical stabilisation and offers life-size magnification						_				85	

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Mirrorless	Le	er	ISES	IMAGE Stabilisation	N N	CANON RF Micro 4 Thirds	1E 1/2	TMX	LEICA L Fill Framf	MIN FOCUS (CM)	FILTER THREAD (MM)	DIAMETER (MM)	LENGTH (MM)	IT (G)
				STABI	CANON M	CANO			LEICA L	MINE	FUER			WEIGHT (G)
LENS	RRP	SCO	RE SUMMARY				MOUN					DI	MENSIO	DNS
NISI MIRRORLESS							74 W 3							
9mm f/2.8 ASPH 15mm f/4 ASPH	£398 £429		Weather-sealed ultra-wide manual-focus prime for APS-C and Micro Four Thirds mirrorless cameras Ultra-wide manual focus prime for full-frame mirrorless promises minimal distortion and 10-ray sunstars			•	· ·	•		20 13	67 72	74 75.6	78 80.5	364 470
<b>OLYMPUS / OM SYSTE</b>	M N	IIRF	RORLESS											
7-14mm f/2.8 ED Pro			Super-wideangle zoom lens that's dustproof, splashproof and freeze-proof			•				20	n/a	78.9	105.8	534
8mm f/1.8 Pro Fisheye	£799		Fisheye lens with impressive image quality that's dustproof, splashproof and freeze-proof			•				12	n/a	62		315
8-25mm f/4 ED Pro	£899 £89	5★	Weather-sealed wideangle zoom with premium optics and extended tele range that accepts 72mm filters			•				23	72	77	88.5	
9mm f/8 Fish-eye Body Cap Lens 9-18mm f/4-5.6 ED	£630		Slimline lens in a body cap with 140° angle of view This super-wideangle lens offers an equivalent focal range of 18-36mm in 35mm terms							20 25	n/a 52	56 56.5	12.8 49.5	
9-18mm f/4-5.6 ED II	£600		Updated ultra-wideangle zoom gains water-repellant fluorine coating and OM System branding							25	52	56.2		154
12mm f/2.0 ED	£739	5★	A wideangle fixed lens for the Micro Four Thirds system			•				20	46	56	43	130
12-40mm f/2.8 ED Pro	£899		Weather-resistant standard zoom with top-notch optics and a constant aperture of f/2.8			•				20	62	69.9	84	382
12-40mm f/2.8 ED Pro II	£899 £599	5.4	Gains uprated IP53 weather-resistance, improved optical coatings, and the 'OM System' badge							20 23	62 58	69.9 63.4	84 70	382 254
12-45mm f/4 Pro 12-100mm f/4 IS ED Pro	£1099		Excellent compact, lightweight weather-sealed zoom that offers 0.5x magnification at all focal lengths Superb high-end weather-sealed superzoom lens featuring powerful in-lens IS with Sync IS							15	72	77.5	116.5	
12-200mm f/3.5-6.3 ED		4★	24-400mm equivalent superzoom includes weather-sealed construction and decent optics			•				22	72	77.5	99.7	
14-42mm f/3.5-5.6 II R	£269		A redesigned variation of the standard kit lens			•				25	37	56.5	50	112
14-42mm f/3.5-5.6 EZ	£329		Compact kit lens for Olympus PEN and OM-D models with powerzoom control			•				20	37	60.6	22.5	
14-150mm f/4-5.6 II	£550		High-powered zoom for all your needs - from wideangle to telephoto - plus weather-resistance			•				50	58	63.5	83	285
17mm f/1.2 ED Pro 17mm f/1.8 MSC	£1300 £450	5+	High-end, large-aperture weather-sealed prime designed for documentary or landscape work Wide-aperture, wideangle prime boasting excellent peak sharpness and low colour fringing							20 25	62 46	68.2 57	87 35	390 120
20mm f/1.4 ED Pro		4.5*	Compact, large-aperture standard prime that's the first lens to wear the 'OM System' label							25	58	63.4	61.7	247
25mm f/1.2 ED Pro	£1099		Large maximum-aperture prime combines impressive sharpness with lovely bokeh and fast, reliable AF							30	62	70	87	410
25mm f/1.8	£370		Compact prime lens with ultra-bright f/1.8 aperture			•				25	46	57.8	42	137
30mm f/3.5 ED Macro	£249		New in the M.Zuiko Premium range, this macro lens features super-fast AF and weighs only 128g			•				9.5	46	57	60	128
40-150mm f/2.8 ED Pro 40-150mm f/4 ED Pro	£1299 £799		This high-quality 80-300mm equivalent lens offers amazing portability for this pro class Remarkably compact telephoto zoom provides high-quality optics and weather-sealed construction							70 70	72 62	79.4 68.9	160 99.4	760 382
40-150mm f/4-5.6 R	£309	4.3 🗙	This middle-distance zoom lens has an 80-300mm 35mm-equivalent focal length							90	58	63.5	83	190
45mm f/1.2 ED Pro	£1200		Large-aperture lens designed for portrait photography with premium optics			•				50	62	70	84.9	
45mm f/1.8		5★	Fast-aperture lens for taking portrait shots is sharp, quiet and has no colour fringing			•				50	37	56	46	116
60mm f/2.8 Macro	£450		High-precision macro lens that's dustproof and splashproof			•				19	46	56	82	185
75-300mm f/4.8-6.7 ED II	£499 £799	<b>6 -</b>	Update featuring Zuiko Extra-low Reflection Optical coating said to reduce ghosting							90 84	58 58	69 64	117 69	423 305
75mm f/1.8 ED 90mm f/3.5 Macro ED IS Pro	£1299		Ultra-fast prime lens ideal for portraits and action shots Pro-spec macro lens with twice life-size magnification, weather-sealing, and optical stabilisation							22	62	69.8		453
100-400mm f/5-6.3 ED IS	£1100		Large, weather-sealed optically stabilised ultra-telephoto zoom, compatible with teleconverters			•				130		86.4	205.7	
150-600mm f/5-6.3 ED IS	£2499		Optically stabilised ultra-telephoto zoom that offers a massive 300-1200mm equivalent range	•		•				280			264.4	
300mm f/4 IS Pro	£2200		Compact ultra-telephoto prime with optical image stabilisation, compatible with Sync IS	•		•				140	77	92.5	227	1270
PANASONIC MIRRORLE														
G 7-14mm f/4	£740	5★	For a wideangle zoom, the overall level of resolution is very impressive			•				25	n/a	70	83.1	
G 8mm Fisheye f/3.5 DG 8-18mm f/2.8-4 Leica ASPH	£730 £1049		The world's lightest and smallest fisheye lens for an interchangeable-lens camera Splashproof, dustproof and freeze-proof ultra-wideangle zoom with premium optics							10 23	22 67	60.7 73.4	51.7 88	165 315
DG 9mm f/1.7 Leica Summilux ASPH	_	4.5★	Compact large-aperture wideangle prime with an 18mm equivalent angle of view							9.5	55	60.8	52	130
DG 10-25mm f/1.7 Leica ASPH	£1800	1.0 A	The world's fastest standard zoom lens, with an unusual 20-50mm equivalent range			•				28	77	87.6	128	690
DG 12mm f/1.4 Leica Summilux ASPH	£1199	4.5★	Compact fast wideangle quality with excellent optics and built-in aperture ring			•				20	62	70	70	335
G 12-32mm f/3.5-5.6 MEGA OIS	£270		Very compact with a versatile zoom range and three aspherical lenses	•		•				20	37	55.5	24	70
G X 12-35mm f/2.8 OIS II DG 12-35mm f/2.8 ASPH OIS Leica	£880 £880		Fast standard zoom with premium optics and weather-resistant constcrution Updated fast standard zoom with reduced focus breathing and smoother aperture operation for video	1						25 15	58 58	67.6 67.6	73.8 73.8	
G 12-60mm f/3.5-5.6 OIS ASPH	£439	4★	Incorporates a stepping motor for a smooth, silent operation and features a dust and splashproof design							20	58	66		
DG 12-60mm f/2.8-4 OIS Leica	£880		Premium standard zoom with useful focal-length range and weather-resistant construction	•		•				20	62	68	86	320
G 14mm f/2.5 II	£249		Wideangle pancake lens that should suit landscape photographers			•				18	46	55.5	20.5	
G X 14-42mm f/3.45-5.6 X PZ POWER OIS	£369	4★	Powered zoom; impressive results in terms of both sharpness and chromatic aberration	·		•				20	37	61	26.8	
G 14-45mm f/3.5-5.6 MEGA OIS G 14-140mm f/3.5-5.6 ASPH POWER OIS II	£189 £619		A lightweight and compact standard zoom featuring MEGA OIS optical image stabilisation Weather-resistant update to Panasonic's optically stabilised superzoom lens	:						30 30	52 58	60 67	60 75	195 265
DG 15mm f/1.7 Leica Summilux	£549	4★	High-speed prime with a compact metal body, includes three aspherical lenses to cut down distortion							20	46	57.5		115
G 20mm f/1.7 ASPH II	-	4.5★				•				20	46	25.5	63	87
G 25mm f/1.7 ASPH		4.5★				•				25	46	60.8		125
DG 25mm f/1.4 Leica Summilux Asph	£550	5★	A fast-aperture fixed focal length standard lens from Leica			•				30	46	63		200
DG 25mm f/1.4 Leica Summilux II Asph DG 25-50mm f/1.7 Leica ASPH	£580 £1800		Updated version of this lovely fast standard prime adds dust- and splash-resistant construction High-end ultra-large-aperture short telephoto zoom that's designed to complement the 10-25mm f/1.7			•				30 28	46 77	63 87.6	54.5 127.6	205
G 30mm f/2.8 Macro MEGA OIS	£300		Compact lens offering true-to-life magnification capability for better macro images							10	46	58.8		180
G 35-100mm f/4-5.6 ASPH MEGA OIS	£300		Telephoto zoom equivalent to 70-200mm on a 35mm camera	•						90	40	55.5	50	135
G X 35-100mm f/2.8 Power OIS II	£970		Premium fast telephoto zoom with matte-black finish and improved autofocus and aperture control	•						85	58	67.4	100	360
DG 35-100mm f/2.8 Power OIS Leica Vario-Elmarit	£1099		Updated fast telephoto zoom promises improved flare resistance thanks to Nano Surface Coatings	·		•				85	58	67.4		
DG 42.5mm f/1.2 Leica DG OIS	£1399	5★	Mid-telephoto high-speed Leica DG Nocticron lens with 2 aspherical lenses and ultra-wide aperture	•		•				50	67	74		425
G 42.5mm f/1.7 Power OIS DG 45mm f/2.8 OIS Macro Leica	£349 £539		Mid-telephoto lens with a 35mm equivalent of 85mm, its f/1.7 aperture promises a beautiful bokeh effect Tiny macro lens with 1:1 magnification and optical image stabilisation	•						37 15	31 46	55 63	50 62 5	130 225
G 45-150mm f/4-5.6 MEGA OIS	£280	4★	Compact, lightweight telephoto zoom comprising 12 elements in nine groups							90	52	62	73	220
G X 45-175mm f/4-5.6 X PZ POWER OIS	£400		A powered long-focal-length zoom lens	•						90	46	61.6		
G 45-200mm f/4-5.6 MEGA OIS II	£380		Telephoto zoom lens with dust and splashproof construction, supports Panasonic's Dual IS	·		•				100	52	70	100	380
DG 50-200mm f/2.8-4 OIS Leica	£1600		Premium telephoto zoom that completes Panasonic's Leica f/2.8-4 series							75	67	76	132	655

We've tried our hardest to ensure that the information in this guide is as complete and accurate as possible. However, some errors will inevitably have crept in along the way: if you spot one, please let us know by emailing ap.ed@kelsey.co.uk. Unfortunately we don't have space to list every single product on the market, so we don't include the most expensive speciality items. **Before making a purchase we advise you to check prices, along with any crucial specifications or requirements, with either a reputable retailer or the manufacturer's website.** 

#### **BUYING GUIDE**

Mirrorless	Ler	ISES	IMAGE Stabilisation	CAN ON M	CANON RF	MILKU4 IHIKUS	SUMT E NIKON Z	FUJIFILMX	LEICA L	FULL FRAME Min Focus (CM)	F ILTER TH READ (MM	DIAMETER (MM)	LENGTH (MM)
LENS	RRP SCOR					M	OUNT					DI	MENSI
G 100-300mm f/4-5.6 MEGA OIS II	£570 4★	Long zoom lens with dustproof and splashproof construction, supports Panasonic's Dual IS	•			•				15		73.6	126
OG 100-400mm f/4-6.3 OIS Leica	£1349	High-quality super-telephoto zoom with weather-sealed construction and Dual IS support	•			•				130	0 72	83	171.
)G 100-400mm f/4-6.3 OIS II Leica	£1499	Updated super-telephoto zoom promises improved zoom mechanism and adds teleconverter compatibility	•			•				13	0 72	83	171.
IG 200mm f/2.8 OIS Leica	£2699 5★	Stunning 400mm-equivalent fast telephoto prime, comes with 1.4x teleconverter in the box								11	5 77	87.5	174
14-28mm f/4-5.6 Macro		Lightweight and affordable ultra-wideangle zoom that offers unusually close focusing							•	· 15		84	89.8
5 Pro 16-35mm f/4	£1499	Relatively compact and lightweight premium wideangle zoom with weather-sealed construction							•	· 25		85	99.6
18mm f/1.8		Large-aperture ultra-wideangle prime that's relatively compact, lightweight and affordable								· 18		73.6	82
20-60mm f/3.5-5.6	£619	Compact, lightweight and relatively inexpensive standard zoom with a wider than usual view								· 15		77.4	87.2
										· 24		73.6	82
24mm f/1.8		Wideangle prime that's relatively lightweight and compact	-			_	_						
Pro 24-70mm f/2.8	£2250	Pro-range fast standard zoom includes dust- and splash-resistance, along with a focus-clutch mechanism								· 37		90.9	140
24-105mm f/4 Macro OIS	£1750	L-mount full-frame standard zoom which offers half-life-size magnification							· 1	· 30		84	118
5 28-200mm f/4-7.1 Macro OIS		Unusually small and lightweight full-frame superzoom lens, but with slow maximum aperture in return	•						•	· 14		77.3	93.4
5 35mm f/1.8		Relatively compact and lightweight full-frame prime designed for both stills and video shooting							÷	· 24		73.6	82
5 Pro 50mm f/1.4	£2300	Premium, fast standard prime for full-frame mirrorless with built-in aperture ring							•	· 44		90	130
50mm f/1.8	£429 4★	Relatively lightweight and affordable standard prime that gives fine mages but can struggle with close focus							· .	· 45		73.6	82
5 85mm f/1.8	£600	This short telephoto portrait lens is the first in a new line of practical, affordable f/1.8 primes							•	· 80	67	73.6	82
Pro 70-200mm f/2.8 OIS	£2599	Pro-spec fast telephoto zoom incorporating optical image stabilisation and weather-sealing							•	· 95	82	94.4	208.
5 Pro 70-200mm f/4 OIS	£1300	Image-stabilised, weather-sealed telephoto zoom for L-mount full-frame mirrorless							•	· 92		84.4	179
5 70-300mm f/4.5-5.6 Macro OIS	£1260	Relatively lightweight optically-stabilised telephoto zoom featuring dust- and splash-proof construction							•	· 54		84	148
5 100mm f/2.8 Macro		Unusually small and lightweight short-telephoto macro that offers life-size magnification								· 20		73.6	82
100mm 1/2.0 Macio	L333 3 A	טומטעמוץ אוומו מוע ווצונשבוצונ אוטור נבובףווטנט וומבוט נומנ טורביא ווב-אב וומצווווכמנוטו								20	01	13.0	02
SAMYANG MIRRORLE	SS												
		Fishers manual fears with Illtra Multi Costed land shares to reduce flow and sharting									-1-	40.2	00
7.5mm f/3.5 UMC fisheye MFT	£253	Fisheye manual-focus lens with Ultra Multi Coated lens elements to reduce flare and ghosting								9		48.3	60
8mm f/2.8 UMC fisheye II	£249	Updated version of the Samyang 8mm f/2.8 UMC Fisheye lens, with improved optical construction	T	•				•		30			64.4
2mm f/2 NCS CS	£330	Fast wideangle prime for APS-C and Micro Four Thirds mirrorless cameras		•		• •		·		20		72.5	59
5mm f/1.2 ED AS UMC CS		Standard-angle manual-focus lens for mirrorless cameras with APS-C sensor size		÷		• •		·		38		67.5	74.2
Omm f/1.2 AS UMC CS	£299 5★	Fast telephoto prime that can produce stunning results with a super-shallow depth of field		•		• •		•		50		67.5	74.5
5mm f/1.8 ED UMC CS	£319	Manual-focus medium-telephoto portrait prime for APS-C mirrorless cameras		•				•		65	62	67.5	81
00mm f/6.3 ED UMC CS Reflex	£249	A compact reflex mirror lens dedicated for mirrorless compact system cameras		· ·				•		90	58	73.7	64.5
2mm f/2 AF	£402 4★	Affordable large-aperture ultra-wide prime for APS-C cameras, available in E and X mounts				•				19		70	59.2
4mm f/2.8 AF	£629	Autofocus wideangle prime for Sony full-frame mirrorless FE mount cameras	T							· 20		85.5	97.5
8mm f/2.8 FE AF	£350	Compact, lightweight autofocus wideangle prime for Sony full-frame mirrorless cameras								· 25		63.5	60.5
4mm f/1.8 FE AF	£460	Boasts Custom Mode function that sets the lens to infinity focus for astrophotography								· 19		65	71.5
		Small, lightweight autofocus wideangle prime for full-frame mirrorless cameras								· 24		61.8	37
4mm f/2.8 FE AF			T										
4-70mm f/2.8 FE AF	£828	Samyang's first-ever zoom lens includes a manual focus ring that can be switched to controlling aperture								· 35		88	128.
5-150mm f/2-2.8 FE AF	£1319	Ultra-large-aperture zoom with weather-sealed construction and video-friendly features	F			1				· 33		92.8	157.
5mm f/1.4 FE AF II		Large-aperture prime with AF-stop button and custom mode switch for manual focus ring								· 29		75	115
5mm f/1.8 FE AF	£360	Smaller, lighter and more affordable than its Sony equivalent, with a dual-mode manual focus / control ring								· 29		65	63.5
5mm f/2.8 FE AF		Compact, lightweight, inexpensive autofocus prime lens for full-frame mirrorless cameras				•				· 35		61.8	33
5mm f/1.8 FE AF	£350 4.5★	Small standard prime for Sony full-frame mirrorless								· 45		61.8	56.3
iOmm f/1.4 FE AF II	£599 4.5★	Billed as the smallest and lightest large-aperture 50mm prime for Sony FE, with completely new optical design	1							· 40	72	80.1	88.9
75mm f/1.8 AF	£380 4.5★	Small, lightweight short telephoto for full-frame Sony, also available in Fujifilm X mount				•		•		· 69	58	65	69
35mm f/1.4 FE AF II	£639	Relatively lightweight portrait prime with a focus hold button and custom mode switch								· 85	72	83.4	99.5
35mm f/1.8 FE AF	£799	Fast-aperture mid-telephoto lens designed for subjects such as portraiture and astrophotography								· 69		93.4	
SIGMA MIRRORLESS													
0-18mm f/2.8 DC DN   C	£600 45*	Strikingly compact and lightweight large-aperture ultra-wideangle zoom for APS-C cameras								11.	6 67	72.2	64
6mm f/1.4 DC DN   C		Large-aperture wideangle lens with dustproof and splashproof design								25		72.2	1.1.1
8-50mm f/2.8 DC DN   C		Fast standard zoom for APS-C mirrorless, that's relatively inexpensive but lacks optical stabilisation									1 55	61.6	
		······································											
3mm f/1.4 DC DN   C	£450	Large-aperture prime for APS-C cameras with 35mm equivalent angle of view	T							25	_		
Omm f/1.4 DC DN   C		A prime for Micro Four Thirds and Sony E-mount users, it's impressively sharp even at f/1.4		•		• •		1	÷	30		64.8	73
6mm f/1.4 DC DN   C		Small, lightweight large-aperture portrait prime for APS-C Sony and Micro Four Thirds		÷		• •		·		50		66.5	
4mm f/1.4 DG DN   A		World's first 14mm lens with a bright $f/1.4$ aperture, designed with astrophotography in mind				•			•	· 30			
5mm f/1.4 DG DN Fisheye   A	£1859	Full-frame f/1.4 fisheye lens, which covers the entirety of full-frame and provides a 180 $^\circ$ angle of view				•			•	· 38.			157.
4-24mm f/2.8 DG DN   A		Superb ultra-wide zoom for full-frame mirrorless that's two-thirds of the weight of its DSLR equivalent				•			· .	· 28		85	131
6-28mm f/2.8 DG DN   C		Relatively compact and affordable ultra-wideangle zoom designed to complement the 28-70mm f/2.8							•	· 25			100.
7mm f/4 DG DN   C I-series	£550 4★	Small and lightweight ultra-wideangle prime that boasts all-metal barrel construction							•	· 12		64	48.8
Dmm f/1.4 DG DN   A	£859	Bright wideangle prime that includes an array of features designed for astrophotography							•	· 23			
Dmm f/2 DG DN   C I-series			T										_
· · · · ·		Small wideangle autofocus prime with a large maximum aperture and premium metal construction				1				· 22		70	74.
4mm f/1.4 DG DN   A	£779	Large-aperture wideangle prime boasts aperture ring, focus lock switch, and rear filter holder	T						•	· 25			95.
4mm f/2 DG DN   C I-series	£550 5★	Moderately fast premium wideangle prime with metal construction, aperture ring, and great optics							·	· 24.		70	74
4mm f/3.5 DG DN   C I-series	£480	Compact metal-barrelled wideangle prime that offers half life-size magnification	1							· 10.		64	48.
4-70mm f/2.8 DG DN   A	£1050	Large-aperture standard zoom for full-frame mirrorless that promises 'best in class' image quality	1						· .	· 38	82	87.8	122.
8-70mm f/2.8 DG DN   C	£760 4.5★	Small, lightweight and relatively affordable large-aperture full-frame standard zoom							· .	· 19	67	72.2	101.
5mm f/1.2 DG DN   A	£1459	World's largest-aperture autofocus lens for either Sony E or Leica L mount promises top-notch optics	T			1.			•	· 30		87.8	
5mm f/1.4 DG DN   A		General-purpose fast prime promises top-notch optics, fast quiet AF, and a comprehensive set of controls								· 30		75.7	
5mm f/2 DG DN   C I-series	£550	Everyday walkaround prime that promises premium optical performance	T			1.				· 27		70	65
									•				
5mm f/2.8 DG DN   C	£549	Ultra-compact full-frame standard prime for everyday shooting, with all-metal barrel construction	F			1				· 24		64	46.2
Dmm f/1.2 DG DN   A	£1399	Fully featured ultra large-aperture standard prime that's surprisingly compact and affordable							÷	· 40		81	108.
)mm f/1.4 DG DN   A		All-new, designed for mirrorless version of Sigma's legendary 50mm f/1.4 'Art' lens							·	· 45		78.2	109.
Dmm f/2 DG DN   C I-series	£620 4.5★	Relatively compact everyday standard prime, with metal barrel construction and aperture ring				•			·	· 45		70	68
5mm f/2 DG DN   C I-series	£650	Compact short-telephoto portrait prime designed to deliver sharp images with attractive background blur							•	· 55	62	72	74.
0-200mm f/2.8 DG DN OS   S		Designed-for-mirrorless fast telezoom includes weather-sealed construction and declickable aperture ring							•	· 65			205
5mm f/1.4 DG DN   A		Superb large-aperture portrait prime for full-frame cameras that's a fraction of the size of its SLR equivalent							•	· 85		82.4	
Omm f/2.8 DG DN   C I-series		Small short-telephoto prime with all-metal construction and aperture ring that's ideal for portraits							•	· 50		64	61.7
00-400mm f/5-6.3 DG DN 0S   C	£899 5★	Relatively compact, lightweight and affordable long telephoto zoom with optical stabilisation							_	111			199.
05mm f/2.8 DG DN Macro   A	£700 5★	Weather-sealed 1:1 macro lens that delivers superlative image quality							•	· 29.			133.
0-600mm f/4.5-6.3 DG DN OS   S 50-600mm f/5-6.3 DG DN OS   S	£2000 £1200	Unique 10x ultra-telephoto zoom for E and L mounts with a shortest focal length of 60mm Ultra-telephoto zoom that aims to provide pro-spec optics and build quality in a relatively light package				•			•	· 45 · 58		119.4 109.4	

Mirrorles	s Ler	ses	IMAGE Starii Ication	CANON M	CANON RF	MICRO 4 THIRDS Sony E	NIKON Z Eniten M Y	LEICA L	FULL FRAME MIN FOCUS (CM)	FILTER THREAD (MM)	DIAMETER (MM)	LENGTH (MM)
LENS	RRP SCOR	SUMMARY					UNT					MENSI
SONY MIRRORLESS												
E 10-18mm f/4 OSS	£750 4★	uper-wideangle zoom with Super ED glass and Optical SteadyShot image stabilisation							25	62	70	63.5
E 10-20mm f/4 G PZ		tra-wideangle powerzoom lens for APS-C mirrorless with dust- and moisture-resistant construction				•			13	62	69.8	55
E 11mm f/1.8		ghtweight large-aperture ultra-wideangle prime for APS-C cameras, aimed primarily at vloggers							15	55	66	57.5
E 15mm f/1.4 G	£750	arge-aperture APS-C wideangle prime with premium optics, weather-sealing and an aperture ring							17	55	66.6	69.5
E 16mm f/2.8 E 16-50mm f/3.5-5.6 PZ OSS		ancake lens for APS-C mirrorless, with a circular aperture and Direct Manual Focus ny pancake lens with power zoom, ED glass and Optical SteadyShot image stabilisation		_					24 25	49 40.5	62 64.7	22.5
E 16-55mm f/2.8 G		remium, high-resolution, weather-resistant standard zoom for APS-C mirrorless cameras							33	40.J	73	100
E 16-70mm f/4 ZA OSS Vario-Tessar T*		lightweight, versatile mid-range zoom with a constant f/4 aperture							35	55	66.6	75
E 18-55mm f/3.5-5.6 OSS		ptical SteadyShot, said to be silent during movie capture, and a circular aperture							25	49	62	60
E 18-105mm f/4 G PZ OSS		ony G lens for E-mount cameras with a constant f/4 aperture	•			•			45	72	78	110
E 18-110mm f/4 G PZ OSS		onstant f/4 maximum aperture powerzoom for video production, for Super 35mm / APS-C cameras							40	95	110	167.5
E 18-135mm f/3.5-5.6 OSS		ghtweight, compact standard zoom designed to match Alpha 6000-series cameras	•						45	55	67.2	88
E 18-200mm f/3.5-6.3 OSS LE		naller and lighter than comparable lenses, this is an ideal high-magnification travel lens							50	62	68	98
E 18-200mm f/3.5-6.3 PZ OSS		pasts powered zoom and image stabilisation with Active Mode, making it ideal for movies							30	67	93.2	99
E 20mm f/2.8 E 24mm f/1.8 ZA Sonnar T*		ancake wideangle lens promises to be the perfect walkaround partner for E-mount cameras up-quality Carl Zeiss optic ideally suited to Alpha 6000-series bodies							20 16	49 49	62.6 63	20.4
E 30mm f/3.5 Macro		macro lens for Sony's APS-C compact system cameras							9	49	62	55.5
E 35mm f/1.8 OSS		ghtweight, versatile prime with Optical SteadyShot image stabilisation							30	49	62.2	45
E 50mm f/1.8 OSS		handy, low-price image-stabilised portrait lens for the APS-C Alpha mirrorless range				•			39	49	62	62
E 55-210mm f/4.5-6.3 OSS	£289	ghtweight optically stabilised telephoto zoom lens for APS-C mirrorless	•			•			100	49	63.8	108
E 70-350mm f/4.5-6.3 G OSS		igh-end long telephoto zoom for APS-C E-mount cameras includes optical stabilisation	•						110		77	142
FE 12-24mm f/2.8 GM		ne world's widest-angle zoom with a constant f/2.8 maximum aperture promises pro-level quality							28	n/a	97.6	137
FE 12-24mm f/4 G		ompact, weather-resistant super-wideangle zoom with high-quality optics							28	n/a	87	117.
FE 14mm f/1.4 GM		emarkably small and lightweight large-aperture ultra-wideangle prime that accepts rear gel filters							25	n/a	83	99.8
FE 16-35mm f/2.8 GM FE 16-35mm f/2.8 GM II		remium G Master-series fast wideangle zoom with weather-resistant construction	_						28	82 82	88.5 87.8	121.
FE 16-35mm f/4 ZA OSS Vario-Tessar T*		I-new wideangle zoom that combines premium optics, relatively compact size, and weather-sealing eiss full-frame wideangle zoom lens that provides consistently good image quality							22	72	78	98.5
FE 16-35mm f/4 G PZ		nall and lightweight ultra-wideangle zoom with superbly implemented power zoom operation	_						23	72	80.5	88.1
FE 20mm f/1.8 G		ompact, super-sharp wideangle prime featuring aperture ring and weather-resistant construction							18	67	84.7	73.5
FE 20-70mm f/4 G		ghtweight standard zoom with excellent optics and an unusually wide view, but a painful price				•			30	72	78.7	99
FE 24mm f/1.4 GM		ompact, large-aperture wideangle prime includes aperture ring and weather-resistant construction							24	67	75.4	92.4
FE 24mm f/2.8 G		nall, lightweight wideangle prime with premium aluminium construction							24	49	68	45
FE 24-50mm f/2.8 G	£1149	arge-aperture standard zoom with relatively compact size but limited focal-length range							33	67	74.8	92.3
FE 24-70mm f/2.8 GM		is pro-grade standard lens for the Sony full-frame FE mount gives exceptionally sharp results							38	82	87.6	136
FE 24-70mm f/2.8 GM II		uperb second-generation pro standard zoom is smaller, lighter, sharper and more video-friendly							30	82	87.8	
FE 24-70mm f/4 ZA OSS Vario-Tessar T*		ompact lens with an f/4 maximum aperture across the zoom range and built-in image stabilisation							40	67	73	94.5
FE 24-105mm f/4 G OSS FE 24-240mm f/3.5-6.3 OSS	£1199 5★ £929 3★	ccellent full-frame standard zoom with optical stabilisation and weather-resistant design leal for travel, landscapes and more, with built-in stabilisation. Also dust- and moisture-resistant							38 38	77	83.4 80.5	113. 118.
FE 28mm f/2		is full-frame wideangle prime with a bright f/2 maximum aperture promises excellent sharpness							29	49	64	60
FE 28-60mm f/4-5.6		Itra-compact, retractable kit zoom designed for the rangefinder-style Alpha 7C							30	40.5		45
FE 28-70mm f/3.5-5.6 OSS		uilt-in Optical SteadyShot image stabilisation, lightweight, and a popular zoom range							30	55	72.5	83
FE 28-135mm PZ f/4 G OSS		onstant f/4 maximum aperture powerzoom for video production, for full-frame cameras				•			95	95	162.5	105
FE 35mm f/1.4 ZA Distagon T*		ıll-frame ZEISS Distagon lens with large, bright f/1.4 aperture				•			30	72	78.5	112
FE 35mm f/1.4 GM		tunning large-aperture prime that's smaller, lighter and focuses closer than its ZA predecessor				•			27	67	76	96
FE 35mm f/1.8		ghtweight fast prime with fine optics and quick autofocus that's well-matched to Alpha 7 series bod	es			•			22	55	65.6	73
FE 35mm f/2.8 ZA Sonnar T* FE 40mm f/2.5 G	£699 £630 5★	hen coupled with a full-frame Sony E-mount camera, this prime lens promises to deliver ony's first 40mm prime is a compact, lightweight design with weather-sealed metal build				•			35	49 49	61.5 68	36.5
FE 50mm f/1.2 GM	£2100 5★	ony's first 40mm prime is a compact, ngiftweight design with weather-seared metal build emarkable ultra-fast prime offers stunning quality for the same size and weight as its f/1.4 ZA siblin	Ø						40	72	87	45
FE 50mm f/1.4 ZA Planar T*		ptically excellent premium fast prime, but large and heavy for its class	δ						40	72	83.5	108
FE 50mm f/1.4 GM		uperb large-aperture standard prime with excellent optics and a pro-spec control setup							38	67		96
FE 50mm f/1.8		eatures a new optical design with a single aspherical element, but slow autofocus							45	49	68.6	
FE 50mm f/2.5 G	£630	nall prime boasts an aperture ring that can be switched between clicked and clickless operation				•			35	49	68	45
FE 50mm f/2.8 Macro		ony's budget macro for full-frame CSCs offers decent optics but is slow at focusing							16	55	70.8	71
FE 55mm f/1.8 ZA Sonnar T*		5mm full-frame prime lens with wide aperture allowing good images indoors or in low light							50	49	64.4	70.5
FE 70-200mm f/2.8 GM OSS		ompact, lightweight telephoto zoom lens for full-frame E-mount bodies							96	77	88	200
FE 70-200mm f/2.8 GM OSS II		e world's lightest 70-200mm f/2.8 provides superb optical quality and extensive controls -series telephoto zoom lens, dust- and water-resistant, with built-in image stabilisation							40	77	88	200
FE 70-200mm f/4 G OSS FE 70-200mm f/4 Macro G OSS II		-series telephoto zoom lens, dust- and water-resistant, with duilt-in image stabilisation pdated telezoom boasts excellent optics and useful half life-size macro feature							100 100	72 72	80 82.2	175
FE 70-300mm f/4.5-5.6 G OSS		puared telezoom boasts excellent optics and useful nan me-size macro reature							90	72	84	149
FE 85mm f/1.8		elatively inexpensive portrait lens includes dust and moisture-resistant construction							80	67	78	82
FE 85mm f/1.4 GM		tunning image quality from Sony's premium 'G Master' portrait lens							80	77	89.5	
FE 90mm f/2.8 Macro G OSS		ptically excellent dedicated macro lens for Sony's full-frame E-mount cameras							28	62	79	130.
FE 100mm f/2.8 STF GM OSS	£1700	novative portrait lens combines optical stabilisation and an apodisation filter for smooth bokeh	•			•			57	72	85.2	118.
FE 100-400mm f/4.5-5.6 GM OSS		remium optically stabilised, weather-sealed telezoom designed to match the Alpha 9	•			•			98		93.9	205
FE 135mm f/1.8 GM		arge-aperture portrait prime for full-frame combines exceptional sharpness and attractive bokeh				•			70	82	89.5	127
FE 200-600mm f/5.6-6.3 G OSS	£1799	eather-resistant super-telephoto, with easy-to-use internal zoom design							240	95	111.5	318

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#### **BUYING GUIDE**

Mirrorles	S Le	r	ISES	IMAGE Stabilisation	CANON M	CANON RF Micro4 Thirds	SONY E	ZNOXIN	FUJIFILM X I El Ca I	FULL FRAME	MIN FOCUS(CM)	FILTER THREAD (MM	DIAMETER (MM)	(WW) HIBNBI
				TAB	CAN						<pre>M</pre>	Ĩ		
LENS	RRP	SCOR	RE SUMMARY				MO	UNT					DIN	IENS
TAMRON MIRRORLE	SS													
11-20mm F/2.8 Di III-A RXD	£819		Large-aperture wideangle zoom for Sony APS-C mirrorless cameras with moisture-resistant construction								15	67	73	86.2
17-70mm F/2.8 Di III-A VC RXD		4.5★	Provides a uniquely useful combination of 4.1x zoom range, f/2.8 maximum aperture and optical stabilisation	•					•		19			119.
18-200mm F/3.5-6.3 Di III VC	£390		Lightweight, compact, all-in-one zoom for mirrorless cameras, to cover practically any shooting situation	•	•		•				50	62	68	96.7
18-300mm F/3.5-6.3 Di III-A VC VXD		3★	Superzoom lens for APS-C mirrorless cameras, available in both Fujifilm X and Sony E mounts	•			•		•					125.
17-28mm F/2.8 Di III RXD		5★	Small and lightweight fast wideangle zoom boasts excellent optics and fast autofocus				÷.			÷	19	67	73	99
17-50mm F/4 Di III VXD	£749		Unique zoom for full-frame cameras that extends from the wideangle into the 'standard' range				•			•	30		74.8	114.
20mm F/2.8 Di III OSD M1:2	£399 £879	4.5★	Widest of a trio of lightweight primes offering half life-size magnification and splash-proof build Billed as the smallest and lightest ultra-wideangle f/2.8 zoom for full-frame E-mount cameras				1				11 17	67 67	73 74.4	64 86.5
20-40mm F/2.8 Di III VXD 24mm F/2.8 Di III OSD M1:2	£399	4.3 🛪	Compact wideangle prime designed for high-resolution full-frame mirrorless cameras								17	67	73	64
28-75mm F/2.8 Di III RXD		4.5★	Fast zoom for full-frame mirrorless is relatively compact and has fine optics								12	67	73	117.
28-75mm F/2.8 Di III VXD G2	£849		Second-generation fast standard zoom boasts new, faster AF motor and completely redesigned optics							•	18	67	76	118
28-200mm F/2.8-5.6 Di III RXD		4★	All-in-one superzoom with impressive maximum aperture but limited wideangle and no stabilisation							•	19	67	74	117
35mm F/2.8 Di III OSD M1:2	£399		Optimized Silent Drive (OSD) motor promises full compatibility with advanced autofocus modes				÷.			•	15	67	73	64
35-150mm F/2.0-2.8 Di III VXD		4★	Super-fast standard zoom for Sony full-frame mirrorless with useful close-focus distance				•			•	33	82	89	158
50-400mm F/4.5-6.3 Di III VC VXD	£1250		Telephoto zoom that's similar in size to conventional 100-400mm designs, but starts at 50mm	·			· .			÷	25			183.
70-180mm F/2.8 Di III VXD	£1350	4.5★	Remarkably compact large-aperture telephoto prime includes newly-developed VXD autofocus drive				•				85	67	81	149
70-180mm F/2.8 Di III VC VXD G2 70-300mm F/4 5-6 3 Di III PXD	£1330 £650	1+	Updated large-aperture telephoto zoom gains optical stabilisation while staying compact Lightweight affordable, weather sealed telephoto zoom, available in Nikoo Z and Sony E mounts							•	85 80	67 67	83 77	156. 148
70-300mm F/4.5-6.3 Di III RXD 150-500mm F/5-6.7 Di III VC VXD	£050 £1379	4 🛪	Lightweight, affordable, weather-sealed telephoto zoom, available in Nikon Z and Sony E mounts Long-range telephoto zoom that's similar in packed length to 100-400mm optics, comes in E and X mounts									67 82	93	209.
			בייה יייהטי ניוטאיזטיט בטטא נווערט אוווער או אעטעע וטאגעע דעט דעטאוווו טאנוטא, גטאווכא או ב מוע א אווטעוונא									V2	55	203.
VOIGTLANDER MIRR		5												
10.5mm f/0.95 Nokton	£999		Ultra-large aperture super-wide prime for Micro Four Thirds with manual focus and aperture setting			·					17	72	77	82.4
17.5mm f/0.95 Nokton	£799		35mm equivalent wideangle manual-focus prime with exceptionally large aperture			•						_	63.4	80
25mm f/0.95 Nokton II	£719		All-metal construction with traditional manual focus and aperture rings			•					17		60.6	70
29mm f/0.8 Super Nokton	£1599		Currently the world's fastest photographic lens in production								37		72.3	88.9
42.5mm f/0.95 Nokton 60mm f/0.95 Nokton	£749 £1049		Large aperture short-telephoto portrait lens for Micro Four Thirds cameras								23 34		64.3 82.5	74.0 87.1
SUMM 1/0.95 NOKTON L8mm f/2.8 Color-Skopar	£1049 £469		Unique super-fast manual-focus medium telephoto for MFT offers a 120mm equivalent view Slimline, moderately wideangle manual-focus lens for APS-C mirrorless cameras, available in silver or black								34 17		82.5 59.3	87.
23mm f/1.2 Nokton Aspherical	£409 £629		Lightweight manual-focus lens for APS-C cameras that's available in both Fujifilm X and Nikon Z mounts								17		59.3 59.3	43.8
27mm f/2 Ultron	£449		Small, lightweight prime lens for Fujifilm cameras with a 41mm equivalent angle of view								25		59.3	23.5
35mm f/0.9 Nokton Aspherical	£1200		Ultra-fast manual-focus standard prime for Fujifilm APS-C cameras								35		72.7	64.9
35mm f/1.2 Nokton	£599		Fast standard prime for Fujifilm X and Nikon Z mounts is specifically designed for the smaller APS-C sensor	T				•	•		30		59.6	39.8
35mm f/2 Macro Apo-Ultron	£649		Manual focus macro lens for APS-C mirrorless offering half life-size magnification					•	•		16		60.7	58.4
50mm f/1.2 Nokton	£599		Large-aperture short-telephoto prime for APS-C mirrorless cameras with manual focus and aperture ring						•		39		63.9	49
10mm f/5.6 Hyper Wide Heliar	£749		Covers a phenomenal 130° angle of view, with optics designed to minimise distortion				•			•			67.8	58.7
15mm f/4.5 Super Wide Heliar III	£649		Compact, lightweight ultra-wideangle manual-focus prime that still accepts 58mm filters				÷	·		÷	30		66.4	62.3
21mm f/1.4 Nokton	£1149		Large-aperture wideangle prime specifically designed for Sony full-frame mirrorless cameras				•			•	25		70.5	79.5
21mm f/3.5 Color-Skopar Asph	£549 £849		Compact wideangle prime with manual focus and aperture operation				•			1	20 30		62.8	39.9 59.9
35mm f/1.2 Nokton SE 35mm f/1.4 Nokton Asph	£849 £639		Super-fast yet relatively compact prime, with 'Still Edition' design optimised for photography not video 'Classic' lens based on symmetrical optical design that only uses spherical lens elements								30 30	58 58	66.5 67	59.9 39.6
35mm 1/1.4 Nokton Aspn 35mm f/2 Apo-Lanthar	£899		Promises the highest resolution and colour correction of all of Voigtlander's E-mount lenses								30 35		62.5	39.0 67.3
10mm f/1.2 Nokton	£810		World's first full-frame lens with a super-fast f/1.2 aperture, promising pleasing bokeh								35	_	70.1	59.3
10mm f/1.2 Nokton SE	£749		Stills Edition' version of this fast prime is smaller, lighter and more affordable							•			66.5	51.9
50mm f/1.0 Nokton Asph	£1699		Impressively compact ultra-large-aperture manual focus lens for Canon RF, Nikon Z, and Sony E mount	T			•	•		•	45		67.6	66.0
50mm f/1.2 Nokton	£899		Super-fast manual-focus prime boasts 12 aperture blades for attractive background blur				•			•	45		70.1	58.8
0mm f/1.2 Nokton SE	£849		SE version does without switchable clicked/clickless aperture mechanism				•			•	45		66.5	58.5
60mm f/2 Apo-Lanthar	£869		Fully manual lens with apochromatic optics designed to completely eliminate colour fringing				•	·		•		_	62.6	61.3
55mm f/2 Macro Apo-Lanthar	£749		High-quality apochromatic macro lens designed for Sony mirrorless offers half life-size reproduction				•	·		·		67	78	91.3
'5mm f/1.5 Nokton Aspherical 10mm f/2.5 Macro Apo-Lanthar	£849 £899		Short telephoto, manual-focus portrait lens for Canon RF-mount mirrorless cameras Manual-focus macro lens with 1:1 magnification and premium apochromatic optics			•						62 58	71.9 78.4	74 99.7
, ,	T023		manuar-זטכעט וומכוט ופווז אונוו ב.ב וומצווווגמנוטוו מווע טופווועווו מעטכוווטווומנול טענולט								J.J	90	10.4	99.I
ZEISS MIRRORLESS														
ouit 12mm f/2.8 Distagon T*	£959		Designed specifically for Sony NEX and Fujifilm X-series CSC cameras. Very impressive performance				•		•			67	82	68
ouit 32mm f/1.8 Planar T*		4.5★	Optimised for use with APS-C format sensors, a fast standard lens for Fujifilm X-series cameras				·		•			52	72	76
ouit 50mm f/2.8 Planar T*	£589		Macro 1:1 lens for extreme close-ups, as well as shooting portraits or panoramas as a light tele-lens				·		·			52	75	91
atis 18mm f/2.8	£990		The Batis range is for mirrorless full-frame system cameras from Sony				·			•		77	78	95
.oxia 21mm f/2	£1230		Compact manual-focus wideangle prime purpose-designed for Sony Alpha 7-series cameras				÷			•		52	62	72
atis 25mm f/2	£980		A wideangle lens for Sony full-frame users offering unrivalled quality				•			•	20	67	81	92
oxia 25mm f/2.4 oxia 25mm f/2	£1190	J 🗶	Gorgeous but ever-so-pricey compact manual focus prime, with absolutely stunning optics				•				25	52	62	69.
oxia 35mm f/2 atis 40mm f/2 CF	£1015 £1130	5+	Small wideangle manual-focus prime intended for Sony Alpha 7 users Bridges the gap between Batis 25mm and 85mm lenses and features close-focusing ability								30 24	52 67	62 91	59 93
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atis 85mm f/1.8	£909	5★	A high-quality medium prime for wedding and portrait shooters, developed for Sony's Alpha 7 series								45 80	52 67	78	105
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# **Final Analysis**

#### John Wade considers...

County fair tintype booth by Frances Benjamin Johnston, 1903

espite their name, tintypes were not made of tin. They comprised extremely thin sheets of iron, hence their more accurate name of ferrotypes. Each sheet was coated in black enamel covered in a photographic emulsion. When developed, they gave a direct positive image straight from the camera within minutes of exposure. Tintypes were cheap to buy and their images extremely durable. Hence the popularity of tintype booths such as this one.

#### Remarkable

Frances Benjamin Johnston was a remarkable woman. Born in 1864, her photographic interests were sparked by the gift of a camera from family friend George Eastman, the man who established Kodak. She photographed rich and famous socialites, including author Mark Twain and became official White House photographer during several presidential administrations, earning her the title of 'Photographer to the American Court'. She travelled widely as a news photographer and later became famous for her critically acclaimed and widely published garden and architectural photography. She was also keen on self-portraiture, depicting herself in assorted costumes and locations, sometimes dressed as a man.

Johnston was a champion of women's rights, a subject about which she wrote extensively, mostly in women's magazines. It appears from this picture that she also had an interest in managing tintype booths, and it was she who took this



picture, not on a tintype but on a 10x8in glass plate.

**Directing a crowd** It's her group shots of people like this that I particularly enjoy. If you've seen anything by filmmaker Jacques Tati, you'll appreciate how, when he films a crowd, it's not random. Each person has been independently directed by Tati to perform and interact with others in a specific way when the camera starts rolling. It's the same with Johnston's group shots. You can imagine her individually positioning each one of the people in a precise pose that they were required to

hold until the shutter clicked.

The more you look at one of her group shots, the more you see. In fact, with a little cropping, I see three separate pictures. The man on the left with the top hat and megaphone makes a great subject all on his own. Similarly the man and two women beside him. I love the way one woman is staring fixedly at the camera, the other has turned slightly to look one way and the man appears distracted by something from the other direction. On the other side of the picture I see a lovely tableau comprising six ladies and the sign behind them. Looking at some

photographers' group pictures, everyone coalesces into a single entity. In Johnston's pictures the eye is drawn to – and you seem to see the personalities of – each individual person.

In articles in *Ladies' Home Journal* Johnston encouraged more women to take an interest in photography, often speaking about the importance of a quick eye and a talent for detail. In today's marketing jargon we might call that her USP (unique selling point), as is beautifully illustrated by this picture.

This image is one of more than 23,000 donated by Johnston to the American Library of Congress.

John Wade is best known for his regular contributions to AP on classic cameras. He is the author of 25 books on social and photographic history. Find him at www.johnwade.org

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