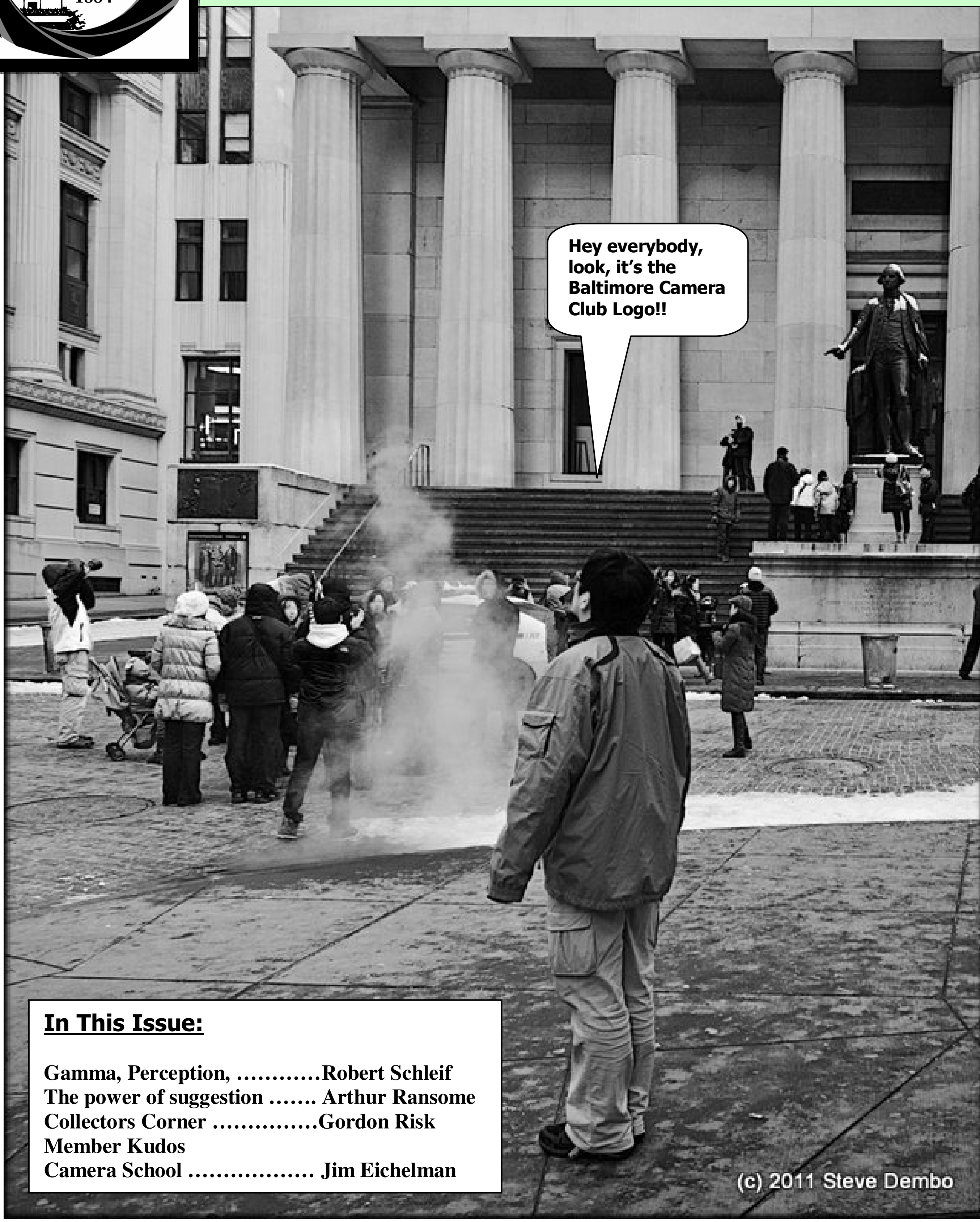
Baltimore Camera Club, Inc.
1884

Focal Point

March 2011



In This Issue:

Focal Point

FROM YOUR EDITOR:

Is it Spring yet?!?!? Earthquakes, Tsunamis, Wild Fires, Floods, and NO SPRING season. Evidence of the global climate change? Who knows. What will Summer (?) bring? (Don't ask me, I'm just the editor.)

However, if you consider yourself a Photographer, weather is not an issue, as a matter of fact weather, especially inclement weather, can make for some interesting photographs. So, don't let the lack of Spring keep you from getting out and taking pictures. Get out and take pictures! Or, read this issue of your Focal Point. Enjoy

Thanks to **Robert Schleif, Arthur Ransome, Gordon Risk** ……. for their contributions this month.

BCC Gets Out

Steve & Irv at the Mt Vernon Mentor Outing

Baltimore Camera Club, Inc. 1884

F o c a l P o i n t

Gamma, Perception, Posterization and Raw Conversion

by Robert Schleif

To reproduce on paper or on a monitor a realistic representation of a scene we have photographed, we merely have to accurately reproduce the apparent brightness of each area of the scene. Exactly how we represent these brightnesses in the original raw file as recorded by the camera or other intermediate files is irrelevant. All we need is a one-to-one mapping between brightness of points in the original scene and how we store the information in files, and the same for an inverse mapping (which could well be media dependent) when we use the files to reproduce the image on paper or a monitor. Exactly what sort of mapping or representation that we use becomes important however, when efficiency, simplicity, and cost are also considered. For example, we may want to store and reproduce an image using the smallest possible file size (let us ignore file compression here) such that the human perceptual system cannot detect that a reduced file size and that a finite number of levels of grayness are being used. Imposition of these later considerations leads to the need for deeper analysis and, for example, illustrates why gamma in digital photography is used. It also provides an explanation of why posterization in dark areas of images occurs more often than in bright areas.

Over a fairly broad range, the human visual system obeys Weber's law in that two levels of gray can just be distinguished as different if they differ from one another by a certain percentage, and this percentage is the same from quite low to quite high levels of brightness. As a result, two levels of gray can be discerned as different if one has a brightness of 1 and the other is $1 \times (1 + c)$times as bright. The next just discernable gray level would have a brightness of $1 \times (1 + c) \times (1 + c)$ and so on. Suppose we wish to present an image using a finite number of gray levels whose levels have been chosen to minimize our visual system's ability to detect that the image is composed of a series of discrete gray levels.

That is, across the range of brightnesses in the scene, we should use a set of grays such that each differs from the next by a constant percentage.

How should the gray levels be chosen if, for example, the brightness difference between the darkest and brightest part of the image is to be 100 (which is about the maximum which can be achieved on a print) and we will allow 256 different levels of gray to be used? The choice of 256 comes about if we allow the 256 levels to be described by 8 binary bits, a useful bit depth for computer files. In this case then, if the darkest gray is a brightness of 0.01, the brightest white will be 1. Thus, $0.01(1 + c)^{255} = 1.0$. Consequently, *c* = 0.0179, and from this, we can calculate the level of all the intermediate levels of gray. That is, the 256 levels of gray are now determined and the brightness of the nth gray level is $0.01(1 + c)^{n}$ and n ranges from 0 to 255. The relationship between the actual brightness B of an area in the original image (for example, in the raw file produced by the camera) and the encoded or converted value, call it *E* (where *E* ranges from 0 to 255) is $B = 0.01(1 + c)^{E}$. The fact that *c* is small permits the approximation $(1 + c) \approx e^{c}$. Hence, $B = 0.01e^{cE}$. Equivalently, $E = {}^{1}/_{c} \ln(100B)$ where ln is natural log.

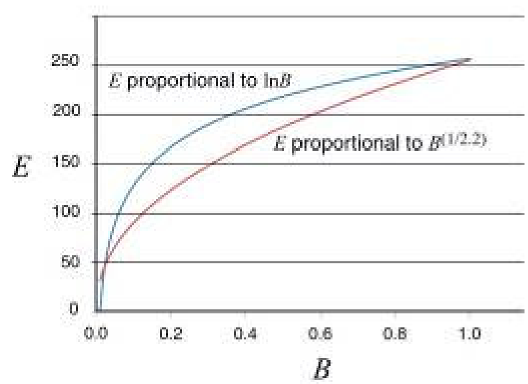
This then is the ideal mapping between actual brightness and the representation of brightness. It maximizes image quality when only a finite number of gray levels can be used. If a sufficient number of grey levels are used, no posterization will be visible from the darkest to the lightest area of the image. If an insufficient number of grey levels are used, their presence will be equally perceptible across the entire tonal range of the image, that is, posterization will be no more visible in the dark shadows than it will be in the lightest parts of the image.

F o c a l P o i n t

Gamma, Perception, Posterization and Raw Conversion

Why doesn't the ideal mapping that was derived in the previous paragraph contain something including the well known gamma? The reason for the use of gamma and its commonly chosen value of 2.2 comes from the properties of cathode ray tubes (early television) that once were used to display images. CRT tubes have an approximate 2.2 power law relation between their apparent brightness and an input voltage. In the early days, for convenience, image information was converted in the cameras by the transformation $B^{(1/2.2)}$. After transmission and receipt of this transformed signal, it was directly applied to the CRT tube. The 2.2 power dependence of the display produced an output of the input signal to the 2.2 power. In terms of the original brightness B, the brightness of the output was $\left(B^{(1/2.2)}\right)^{2.2} = B$. That is, the original brightness is produced on the display screen without requiring any explicit transformation or remapping at the receiving end. This scheme has several virtues. First, it eliminates the need for special circuitry to perform the inverse mapping when displaying because the CRT intrinsically does this. Second, properly used, it can compress brightness information into a relatively small number of discrete levels. In this coding-decoding scheme, an image will be perfectly restored if the number of gray levels that represent the original signal is sufficiently high that the human perceptual system cannot discern the difference between the adjacent and discrete values. How close does this scheme compare to the ideal mapping function that was derived in the previous paragraph?

The graph shown below displays the ideal mapping function where E is proportional to $\ln B$ and also the mapping using power law mapping function that has come to be used because of the early use of CRT tubes. Both mapping functions encode the range of brightnesses ranging from 0.01 to 1 in 255 levels of gray.

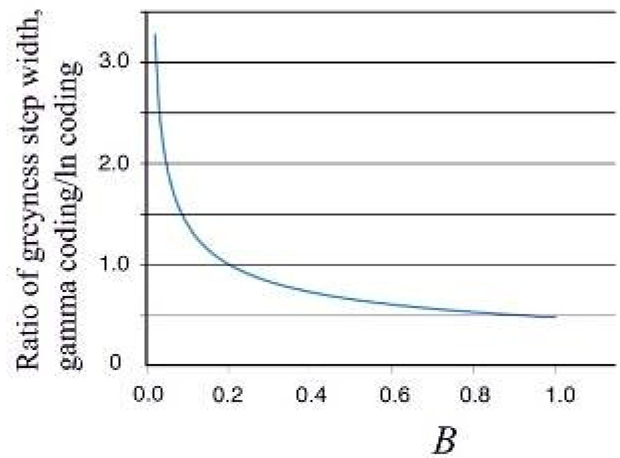


As an aside, note the jump from the point (B,E)=(0,0) to the point (B,E)=(1,32) in the power law mapping. In the definition of the sRGB color space, this discontinuity is eliminated by changing the relationship between B and E over the very bottom part of the curve. A straight line from the origin connects to an early point on the curve. In reality, the situation becomes a little more complex than this, as is described in the site giving the full technical definition of sRGB, http://www.w3.org/Graphics/Color/sRGB.html. In the Adobe RGB color space a linear portion is not included, but the space covers a wider range of B and the linear approximation is not needed.

Gamma, Perception, Posterization and Raw Conversion

The figure above explains why posterization of dark tones occurs more easily than posterization of bright tones. For $B < 0.21$, the slope of the power law conversion curve is less than the slope of the logarithmic conversion curve. This means that for the power law conversion, in this region, any change in E produces a greater change in grayness of B than the ideal change as is described by the logarithmic conversion. That is, the grayness levels are further apart than ideal. In the region $B > 0.21$, the opposite is the case and hence grayness levels in bright areas are closer together than ideal.

The perceptual "size" (ratio of brightnesses) of the grayness steps for the gamma power law compared to step size ln-exponential encoding is plotted below. In the darkest areas of an image the steps in grayness are more than three times the ideal step size, and in the brightest areas, they are only one half of ideal, making a factor of more than six separating the perceptual step size between the darkest and lightest areas of an image. This shows why posterization of shadow areas is much more likely to occur than posterization of bright areas. One should also note that this perceptual variation in the step size is a consequence of the less than ideal nature of using a power law relationship to encode brightness.



Problems with posterization in the image files themselves are eliminated by using 16 bits in files to represent brightness rather than 8 bits. Since red, green and blue are each represented, such color files are sometimes referred to as 48 bit files. The larger file size does not fully eliminate the possibility of posterization on one's computer display however, unless the display uses more than 256 levels of brightness. Many displays and operating systems now use 10 bits (called 32 bit color since 10 bits are used for red, green, and blue, and 32 sounds better than 30) to encode brightness. This is sufficient to prevent discernable posterization in most situations despite the use of gamma=2.2 power law encoding.

The Power of Suggestion Over Description

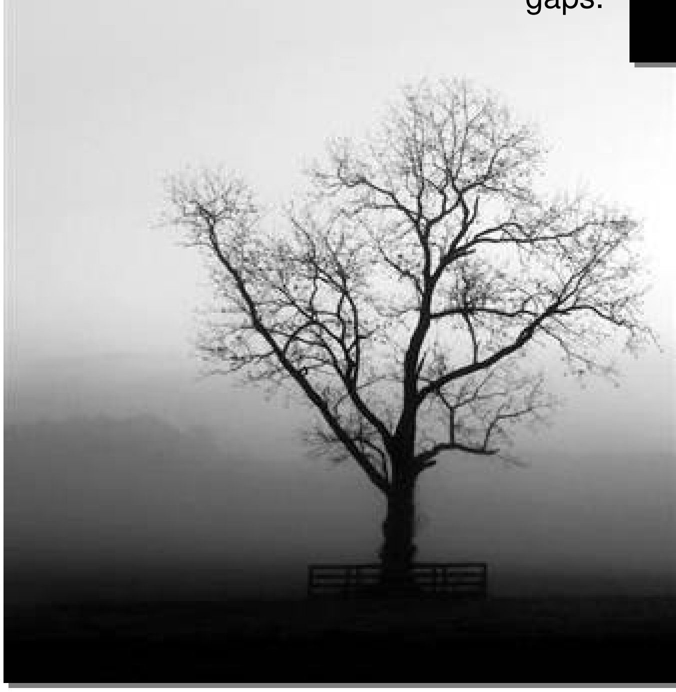
By Arthur Ransome

Does the photographer capture reality or does he / she capture their perception of what is real? It never ceases to amaze me whenever I go on a photography trip with other photographers, even if we all train our camera lenses on the same scene we each come away with images that although similar in appearance feel very different. We interpret the world around us in different ways and that, for me is what makes photography so exciting. It's our own way of describing what it is that we see and feel.

All Photos by Arthur Ransome

The Power of Suggestion Over Description

Documentary photographers and photojournalists attempt to capture the "pure" scene. However, even then, since only a few elements of the scene are actually captured the viewer is still left to interpret the event and its meaning. For example, Nick Ut's Pulitzer prize winning "Vietnam Napalm" image of a young Vietnamese girl running naked down the street after a napalm attack on her village is simply his interpretation of the actual event. Therefore, in the absence of a written story the viewer will always be left wondering what has just happened, what is about to happen and what happened afterwards. Even in photography where there is a strong element of description, a record of a time, thing or event the final image is nothing more than a suggestion where the viewer is required to fill in the gaps.



In fine art photography, when description is not the most critical element suggestion can be put to very powerful use. Suggestion can rouse the senses. You can feel the texture of peeling paint or the bark of an old tree, the wetness of torrential rain or the cold of the snow. You can hear the thunder of water as it leaps over a waterfall, the wind whistling through the branches of a tree, the silence of a world veiled with a blanket of fog. You can smell and taste the food on a market stall or in a restaurant.

The Power of Suggestion Over Description

Since suggestion is so important, just how much descriptive information does the photographer need to include in the images that he / she creates? I think the challenge is to balance the visual elements that describe the scene with the non visual elements that allow the viewer to imagine, to wonder and to experience the feeling that the image imparts. A few elements can tell a lot about a scene. In my work simplification is important. I work hard to create images that contain just the right amount of visual elements that a viewer can then take to explore their own feelings and create their own story.

The Power of Suggestion Over Description

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aransomephoto.com/blog/

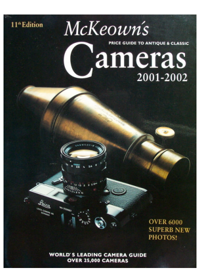
Focal Point

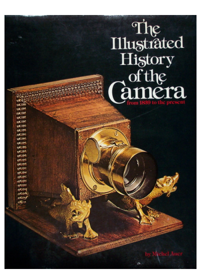
Collectors' Corner

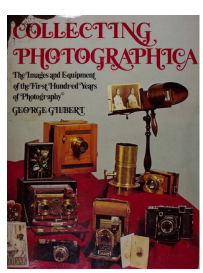
Books of Camera and Photographic History By Gordon Risk

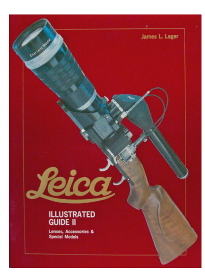
Anyone interested in the history of cameras or photography will find plenty of books available, in book stores or on line. Here are some of my own collection that I learned from and continue to use as reference.
This first group is relevant mostly to cameras. The #s refer to the photos that follow.

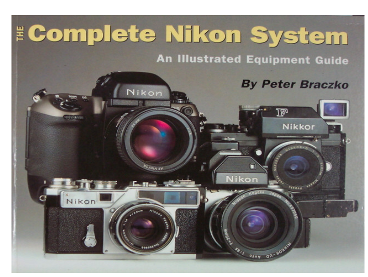
McKeowns Guide to Anitque and Classic Cameras #1..................	McKeown	*The Illustrated History of the Camera #2...........*	Michel Auer
Collecting Photographica #3.........	George Gilbert	*Leica Illustrated Guides #4..................................*	James L. Lager
Complete Nikon System #5..................................	Peter Braczko	*Nikon System Handbook #6..................................*	B. Moose Peterson
Collecting & Using Classic Cameras #7.......	Ivor Matanle	*Collecting & Using Classic SLRs #8.............*	Ivor Matanle
Collectors Guide to Rollei Cameras #9.........	Arthur Evens	*Canon. Rangefinder Cameras 1933-68 #10...*	Peter Dechert
A Century of Cameras...	Eaton S. Lothrop, Jr.	*Classic Cameras...........*	Kate Rouse
Graphic Graflex Photography..................	Morgan & Lester	*Cameras of the 1930s....*	Eugene H. Rifkind
A Review of the Graflex.	Richard P. Paine	*Kodak Cameras.............*	Jim & Joan McKeown
Leica Manual................	Morgan & Lester	*Rollei Photography.......*	Jacob Deschin
Leica, The First Fifty Years............................	G. Rogliatti	*The Retina Manual........*	Edward S. Bomback
Nikon Compendium.......	Stafford, Hillebrand & Hauschild	*Cameras........................*	Brian Coe
Camera Collecting........	Jason Schneider	*Rangefinder..................*	Roger Hicks & Frances Schultz





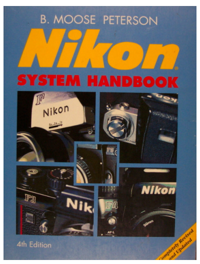


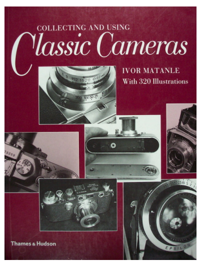


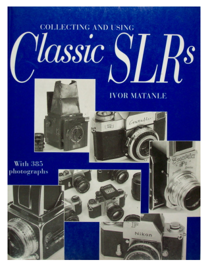


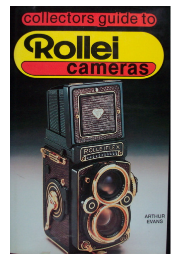
Collectors' Corner

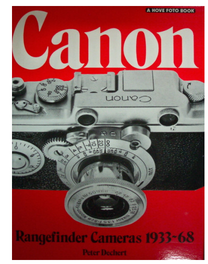
This group includes history of photography.











The History of Photography..................	Spira Collection	*Camera. Vicotrian Eyewitness*.....................	Gus MacDonald
Picture History of Photography..................	Peter Pollack	*Creative Photography*...	Helmut Gernsheim
Leica Witness to a Century..........................	Alessandro Pasi	*Fox Talbot Photographer*................	Robert Lassam
100 Photographs that Changed the World.......	Life magazine	*One Hundred Photographs. A Collection*......................	Bruce Bernard
Mathew Brady...............	Time-Life Book from the Meserve Collection	*Victorian Photography*..	B.E.C. Howarth-Loomes

Kudos

Joan and George Saba won awards in the recent Photographic Society of American (PSA) annual Mid Atlantic Chapter competition.

Joan won four medals plus two honorable mentions. In the Digital Travel category, she won Best of Show and also took Second Place. In Nature Digital, Joan took third place and in Best Animal category, she won Best of Show and two Honorable Mentions. Honorable Mention indicates that you were in the top 25.

George won two Honorable Mentions in Digital Travel.

Congratulations!!

Baltimore Camera Club, Inc. 1884

F o c a l P o i n t

2011 Camera School and Field Shoot

by Jim Eichelman

Want to improve your photography? On April 16th and 17th, we are hosting our annual Camera School. Club members with decades of experience in the field will share their knowledge and provide instructions that will benefit photographers of all backgrounds

On Saturday, April 16th, we will provide classroom sessions at Mt. Washington United Methodist Church (normal meeting location) covering a wide variety of topics such as the technical rules of composition, digital photography techniques, how to break the "rules" and take more creative images, the impact of lens selection, exposure, and post processing options. For example, in our creative images course, our expert instructors will show you how to make your subjects "pop" by showing you the effects of varying field depth and under/over exposure. Show action with blur or stop action by utilizing exposure times and/or ISO. Learn how to shoot in low light.

2011 Camera School and Field Shoot

Our afternoon sessions on April 16th will focus on post processing. With the number of different options available to photographers, our instructors will discuss digital workflow, Photoshop, Elements, and High Dynamic Range (HDR) imaging so you can find the option that is best for you.

On Sunday, April 17th, we will have a field session at Cylburn Arboretum. This beautiful setting will provide you the opportunity to take pictures under the tutelage of our instructors. Practice taking wide-angle shots or focus on taking finely detailed images in our small group sessions. Each group will have less than 5 people per instructor. This guarantees you the opportunity to get personalized instruction and have our instructors answer your questions. This is a great opportunity to apply and sharpen your technical skills in a hands-on setting.

We take pride that our annual Camera School has something for everyone, so take advantage of this opportunity to get out, hone your skills, and learn more about the areas of photography that interest you.

Space is limited. To register, go to our website at www.baltimorecameraclub.org to download our application form. You can submit this form to Michael Boardman (address on registration). The deadline is fast approaching.

If you have any questions, please e-mail Jim Eichelman at jeichelman07@gmail.com. We hope to see you there!