

Plate 1, Gorgonian Garden

This is a planned photo. I had dived in this area many times and noted that there were frequently several snappers in the territory. I brought along a squeeze bottle of ground-up canned tuna fish and "seasoned" the area. The scent kept them around long enough for a photo, without creating a feeding frenzy or leaving food debris in the water.

Using strobes with ultra wide horizontals: Since I wanted a horizontal photo that I could enlarge, I used the fine-grain Kodak 100VS film. I worked so close with my 13mm wide-angle lens, less than a foot from the bottom of the photo, that **I needed three strobes**. The angle of acceptance of the 13mm lens is 180 degrees diagonal so strobes have to be held behind the plane of the lens to avoid showing up in the ultra wide photo. Since I could not hold the strobes far enough to the sides of the large picture area, it was hard to get even coverage and avoid backscatter across the large area. Thus, I used one strobe on each side, feathered away from the center, and a small YS30 strobe from above to accent the fish. I connected them with three single cords and two "T" connectors daisy chained to the RS single synch port.

Slave option: I prefer not to depend on using a slave sensor, as they are not reliable in this type of wide-angle situation. The slave strobe on the right side would not likely see the light bouncing back from the master strobe far to the left, and, in upward situations, the master strobe may be overwhelmed by the sunlight and not seen by the slave. If there is no subject large enough in the center to reflect light to the strobe, it will fail to fire. For more on how slaves work, see the glossary.

Since Sea and Sea discontinued making their "T" connector, I do not know how you would hardwire three strobes with a single port camera. Many housings have two ports, so you could easily use a dual cord in one port and a single, or even another dual in the second port. (Gads—I don't want to start thinking about using FOUR strobes—three is already one too many for moving quickly in the water.)

Plate 2, Orange Canyon

Like Plate 1, this is another planned photo. The divers in the scene worked for me at my underwater photo centre in the Cayman Islands. I knew the area well and planned their positions before we went on the dive.

Using two strobes with wide angle: Because this is a vertical photo, rather than a horizontal photo as in plate 1, I needed only two strobes to light it sufficiently. The strobes can be placed further to the sides with a vertical photo because the picture area is narrower than with a horizontal format. I placed them as far to the sides as my UltraLight strobe arms would allow. Lighting from the sides provided better shadows for texture. If the strobes had been closer to the camera, any shadows from the one may be too weakened by the light from the second strobe and the effect would be ruined.

Plate 3, Orange Canyon Angels

These fish are on the payroll and enjoy an easy handout. They like apples and orange peels, but peas should be popped from their skins before being used for angelfish. We have used canned cheese in the past, but there has been some question raised as to the health risks for fish. Since we had been feeding the same fish for many years, it does not seem to affect their own health, but there is a question that it may affect their reproduction. Any confirmation of this would be appreciated.

This is another example of improving color and contrast by working extremely close with an ultra wide-angle lens. The photo was taken about nine inches away with two strobes, one on each side. I used Fujichrome Velvia, which is a high contrast, saturated film.

I do not often use high contrast films with ultra-wide lenses, as the background exposure is difficult to control. The upward portion gets much lighter than average relative to the lower water area that gets much darker or even black. However, in this photo I was not using an extreme upward angle, and the water in the distant background toward the bottom is not visible and the middle area is fine being quite dark.

Plate 4, Angle Fish in Porthole

I am under the stern wreckage of the Balboa with a Nikonos RS and 20mm lens. This is equivalent to a Nikonos 15mm lens and has about a 90-degree horizontal angle of view. I chose this narrower lens rather than my ultra-wide 13mm, 180-degree lens so that I could work from a little further away. This angel is shyer than those in Plate 3 and I knew that I would need room to maneuver my strobes around the beams under the wreck. An assistant placed food in the opening and as the angelfish came in I was able to photograph it.

I metered first for the background blue, of course, and set the strobes at a distance that matched the background exposure. I used manual focus set for the edge of the porthole and shot when the angelfish came in. The depth of field at the small aperture overcame the reduced depth of field caused by working so close. Aiming upward offered plenty of exposure so that I could use my 1/125th of a second shutter speed and a small f11 aperture.

Plate 5, Trumpet Fish Mouth

Working with fish: Trumpet fish vary considerably in their response to divers—some swim off and others stay put. Many can be maneuvered or slowed down by placing your hand directly in front of their mouth. As they start to turn to the side, smoothly move your hand in that direction to bring them back. If you approach from the side or from behind, they will swim away, but approaching directly from the front often stops them.

Watch to see just what they want to do. If they are cruising along the reef, they are likely a lost cause. If they are hiding comfortably among the gorgonians, they will be easier to approach; they believe that they are well hidden. This small yellow phase was easy to control, and I could place my Nikonos 1:1 frame right around its mouth or even just the eye.

Plate 6, Snapper

Lighting common subjects: Yellow-tailed snappers are common and aggressive and allow many opportunities to experiment with your lighting. Don't pass up the common fish—most viewers do not know what is common or rare; they often respond solely to the impact of the photo. By using a full-power strobe on an overcast day, I could use a very small aperture and thus minimize the background light.

By using a Nikonos with a close-up kit, I could pre-plan my lighting angles, and needed only to wait until the snappers centered themselves in the framer. I used two strobes from the extreme left and right so that there were strong shadows yet the fish were lit on both sides evenly. With a housed SLR, the shooting distance and fish position is harder to control; this makes it more difficult to predict where to place the strobes to produce the intended lighting effects.

Plate 7, Butterfly with Sponges

Making dark backgrounds: To get a dark background, you must have more strobe light on the subject than sunlight. You will need either a high-powered strobe or dim sun (sounds like something good to eat—dim sun). Whenever I want to shoot fish with dark backgrounds, I simply wait for that rare dark, overcast day.

I used only one strobe held from the side and just a little behind so that I could get strong, dramatic shadows on the front of the sponges and the fish is virtually back lit. A second strobe would have destroyed the scene and turned it into just another butterfly photo shot from too far away.

I often use the 60mm rather than the 105mm lens so that I can get a larger scene without having to back up as far as is needed with the 105mm. Each lens has a use in underwater photography so experiment with both. With most digital SLR cameras the 60mm lens becomes more like a 90mm lens so you lose the advantage of the wider macro capability.

Plate 8, Angel Eyes

Choosing photo friendly dive equipment: This camera angle requires perseverance and control. You need perfect buoyancy and the ability to adjust your position with just your fins. I prefer the small full-foot single blade fins so that I can keep my eye to the viewfinder and adjust my position quickly with my fins only. With the single blade fins I can rapidly flex my foot and pull backwards. This ability to maneuver is important and is virtually impossible to do with floppy or split fins.

Using auto focus: I used a lens and camera combination that provided a fast auto focus, and set the camera for continuous rather than "single". I do not often use "continuous", but as I was moving constantly, this setting was faster.

Using "**C**" (**continuous**) allows the camera to constantly focus while you keep the shutter button partially depressed, but it will allow the camera to fire anytime you fully depress the shutter whether the photo is in focus or not. Even with auto focus cameras, many photos of fast moving subjects, such as this angelfish, can be taken quite out of focus.

Using "**S**" (**single servo**) prevents the camera from taking the photo until the image is in focus. If you press the shutter and the picture is not sharp, the camera waits until the auto focus is sharp before it will fire. To make it faster, you must constantly reset the focus by letting go of the shutter release and then pressing halfway each time the subject moves closer and farther; this keeps the camera in focus until you are ready to shoot. I just keep tapping the shutter button and refocusing over and over until I shoot.

Plate 9, French Angel, Yellow Sponge

Making deep blue backgrounds: I used a standard 20 mm wide-angle lens (equivalent to a Nikonos 15mm lens) so that I could fill the frame from about a foot away instead of a half a foot needed with my ultra-wide, 180-degree diagonal 13mm lens.

I wanted the background dark blue so I set my exposure for about a stop and a third under exposed and adjusted the strobe distance to properly match the f-stop. The amount of darkness produced is dependent on the film or camera. With digital cameras, you would have to set the exposure for minus two stops, as minus 0.7 is barely a normal blue exposure. Set the strobe on the power setting that gives you a pleasing foreground.

In this case the background would normally be around f8 so I used f11 and 1/125th second to control subject movement. If your digital camera does not go to f11 simply use f8 and 1/250th second shutter speed. At a foot away a YS90DX strobe would likely be set between -2 and -4 depending on the camera's reaction to the bright yellow sponges.

Plate 10, Soft Sea Plumes

I took a meter reading for the average blue background and turned my strobes to low power so that the strobe portion remained soft and not over-powering. Thus, if the meter said f8, and my strobe chart indicated a distance of two feet for f8, I held the strobes more than two feet away.

See the lesson later for the title page dive boat for more on metering.

Extra photo: Soft sea plumes are made of polyps as shown in this close photo.

Plate 11, Grouper

Using one strobe: This was a quick opportunity that matched the lens I was using. A single strobe keeps the attention on the grouper without drawing any attention to the right side. Too often, people with two strobes forget that they should use the second strobe only when it will help the photo. I need to remind myself on occasion to turn one strobe off. Actually, instead of turning it off, I aim it straight up or behind. It is easier for me to notice that the strobe needs to be re-aimed when I want to return to using two strobes. If I turn one off, it is easy to get distracted and forget to turn it back on.

Plate 12, Two Stingrays

The key to this photo is the use of the ultra wide 12mm lens that allowed me to get close. I am so close that the stingray is lifting his wing to avoid my camera as he swims by. The bright contrast is enhanced with the Fujichrome Velvia film. No strobe is needed in this shallow, four-foot depth.

Plate 13, Stingray and Diver

I started with a meter reading for the ambient light in the blue background that remained relatively constant throughout the dive. The subject had food, of course, to attract the rays. The pose was not planned—the rays set it up all by themselves.

Adjusting weights for balance: The diver is wearing his weights toward his back so that he can kneel in the sand without falling forward. If he had worn his weights in an integrated BC, the weights would have been more in front of him and, especially when combined with the weight of the camera, he would fall forward or have to paddle his hands forward to keep upright.

See Plate 85 for more on balance and buoyancy.

Plate 14, Anemone

This is a good example of when **one strobe can produce a dramatic photo** and two strobes would have ruined it. Whenever the sky is cloudy or overcast, or otherwise dark, you have the opportunity to make photos with dark backgrounds. The narrow beam strobe is held close to the subject to reduce a spread of the light, so that it looks more like a spotlight.

Plate 15, Lettuce Slug Face

Bellows factor with extension tubes: With extreme close-ups, you can position the strobe very close, allowing you to stop down the aperture to f22.

An f-stop is a number that defines the size of the aperture relative to the size of the camera, i.e. the aperture is designated as a "function" of the size of the camera. It is the number of times the diameter of the aperture opening can be divided into the distance between the lens center and the film plane. If eight of the aperture diameters can fit into this distance, it would be called an f/8; the diameter of the opening is 1/8th of the distance. An f/8 is larger on a large camera than on a small one. Thus, if everyone had a different sized camera, but we all set on f/8, we would all get the same exposure; we would all have the same relative amount of light hitting the film.

What does this have to do with holding your strobe really close when using a 1:1 extension tube or when focusing to 1:1 with a macro lens such as the Nikon 60mm micro Nikkor? The extension tube moves the lens further away from the film, just the way the macro SLR lens elongates as you focus closer. By moving the lens and therefore the aperture further away, the distance from the center of the lens to film plane gets longer and thus less light reaches the film. The diameter of the aperture can divide into this distance more times. An f22 aperture on a Nikonos 35mm lens can now divide into the longer distance created by a 1:1 extension tube 44 times--the effective aperture is actually f 44. It is an effective two-stop difference. This two-stop increase is called the "bellows factor." If you leave the lens set for f22, which in reality is now an f44, you will need to hold a medium power strobe about three inches away with ISO 50 speed film.

Plate 16, White Plumed Anemone

Using strobes in poor visibility: The visibility in Monterey Bay, California is often rather limited—thirty feet would be a good day. To reduce the appearance of backscatter, hold your strobe well out to the side so that the light hits the side of the particles rather than the front. If I had wanted a lighter green background, I could turn my strobe to a lower power setting and open the aperture.

Plate 17, Fire Worm

This worm was actively feeding on a gorgonian while I was able to take photographs from several angles. When you have the opportunity, move around and **try more angles** after your first photo. You will often be surprised by each view as you move closer, from behind or below, or even straight down. You can create other surprises by trying different lighting angles. I recommend that you start with standard lighting to at least get a clear documentary photo of the creature. Then move the strobe a little at a time to the side and even a little from behind to create more drama.

Plate 18, Fire Worm

See Plates 17 and 19

Plate 19, Fire Worm

When **working with backlighting**, take care to avoid letting the strobe appear in the photo, or causing flare. You cannot shoot with the strobe directly behind the subject, because it will appear in the photo. If any strobe light directly hits the camera lens, it will cause flare. Angle the strobe so that it hits the back side of the subject, but not the lens. You can hide the strobe from the lens by choosing a subject along the top of a solid ridge such as the edge of a sponge. In this case, I angled the strobe away from the lens and I held my slate against the side of the strobe to block light from hitting the lens.

Plate 20, Crinoid

Holding your breath while taking upward photos: When I saw this crinoid in mid water I had to act quickly—(no, I did not lift it up to fall in the water). I metered upward quickly, turned off my strobe and swam under the crinoid. I breathed out as I approached and then started to breath in slowly as I positioned under it, quit breathing for just a moment, took the photo and then started to breathe in. Since breathing in makes me rise, I had to move my head to the side, finish my breath in and then out quickly to duck under for a second photo. By this time he was settling too low in the water and I had to quit shooting.

If you must shoot with your eye to the viewfinder when aiming up in mid-water, **you must take every precaution to avoid holding your breath as you rise or avoid rising as you hold your breath.** You can enlist the help of your dive buddy to hold your position, do your upward shooting while kneeling on the bottom or holding on to the mooring line with your legs, or keep your depth meter clearly in sight near your camera. Holding your breath while shooting upwards has been a fatal error for several excited photographers, one of whom was well known to me so please take this advice seriously.

Plate 21, Feather Star Arm

Choosing a camera: People often ask me what the best camera is, and there is never a simple answer. For example, I like the SLR cameras that let me see exactly what the image composition looks like before I shoot. However, the Nikonos with extension tubes allows me to shoot from angles that would be impossible with a larger housed camera. For this photo, I held the small Nikonos camera with 28mm lens and 1:2 extension tube low against the coral head so that it aimed straight up into the blue. There would not have been room for the big housing as well as my head and the large tank on my back to get behind the camera to focus and take this photo. There have been many photos in my long career that could be taken only with a small camera.

The LCD screens on some digital cameras are tiny and dim and it can be difficult to find your subject in the scene. Choose a camera that has a bright or large LCD so that you can clearly study and respond to the image. Be sure to set the camera for "Review" mode so that you can quickly check each image as you shoot. Seeing your image right away is one of the main reasons for shooting with digital so USE IT. Many digital SLR photographers who had previously been using film SLR cameras often forget that they even have a monitor—so use your monitor regularly.

On my 2004 trip to the Solomon Islands, the Nikonos with 35mm lens and 2:1 extension tube became my camera of choice for a particularly stubborn photo project that was too difficult with a big SLR.

Plate 22, Shark Eye

Learn about your subjects The key to working with any creature is to try to understand what its reaction to divers is. This nurse shark is a mild shark, but needs its space. If you wish to work with them, don't crowd them suddenly. Leave an opening for them to get away from you when they want to.

Plate 23, Shark Attack

I had an ultra wide lens on my Nikonos RS, so I was able to get extremely close. I metered for the ambient light, as I was quite shallow and expected the sunlight to dominate the photo. The strobe was held back to prevent exposure on the light white skin, but it over-exposed slightly anyway. It is not a work of art, but tells an interesting story. By changing my angle, I was able to work with the perfect arch of the shark's body.

Composition: **Circles, ovals and semi-circles** are all comfortable forms of composition that are appealing to look at because your eye is directed quite certainly from one point of interest to the next. You look first at the area of the head; you then follow the line of the body and return along the bottom to the head and so forth.

Plate 24, Shark

When exploring a dive site, don't forget to **look under ledges**. If you find something interesting, aim your camera and then check that your strobe can hit the intended subject without being blocked by the ledge. With an adjustable arm, you can change the strobe position to a point closer to the lens rather than above the lens where it would light only the overhead.

Plate 25, Shark Mouth

Don't turn down luck when it happens and always shoot, even though you may not expect the photo to work out. A blank piece of film will have nothing on it, but firing the shutter at least gives you a chance of something.

Plate 26, Flamboyant Wall

Composing verticals: I used the ultra wide 13mm lens to make a small, otherwise non-descript red finger sponge into a large, dominating element in the photo. Because it is a strong vertical line, I held the camera vertically to let the viewer know that this was the most important part of the scene.

Although many of the hard corals have died, the green halameda coralline algae look wonderful in a photograph. It does not look at all impressive when you are swimming over it. This is a good example of the difference between what we see and what looks good on film.

Plate 27, Queen angel with Orange Sponge

Working with fish: I used a normal wide-angle lens (Nikonos 15mm) about a foot away to photograph this lovely queen angel. To get the angelfish to stay nearby, I placed a small mirror on the other side of the sponge. He thinks that this is another male in his territory and as he is facing off the "intruder", I have enough time to be careful in getting the photo.

Plate 28, Algae

I do not believe that a subject has to be rare or even has to be an animal to produce a lovely feeling. Although I am excited to find something like a new nudibranch, and may take a few photos, there have been times when I switched to something more common nearby that caught my eye. This sweet, delicate alga had such a perfect shape that I could not pass it up.

Plate 29, Hydroid

Lighting with a narrow beam: Regular lighting would have flattened this scene and made it all quite ordinary. To highlight the hydroid as though it were on stage I used a special light "funnel". This device, made by Sea and Sea is a black, honeycomb tube placed in front of the strobe to allow only a narrow beam of light to reach the subject. Held about nine inches away, it lights an area about two inches in diameter. I am sure that you can see that the hard part is aiming it correctly. I failed so often that I needed a dive buddy to aim the strobe for me while I aimed the SLR camera.

Plate 30, Hermit in the Blue

Handling creatures: Hermit crabs can be picked up with impunity provided that you put them back where you found them. I leave my slate, glove or flashlight on the spot so that I am absolutely sure where I found it. It is easy to get confused and lose the spot.

Meter upward for the blue background. With an SLR and matrix metering, simply look through the camera as you hold the shell in front of the lens. If you have a lot of sunlight in the photo, you may need to be wary of using TTL as the sensor can be fooled by the bright sun and shut the strobes off right away, even though there is not yet enough strobe light for the photo.

Plate 31, Hermit

Using extension tubes: Unlike the technique in plate 30, I shot from a level point of view, with a strobe that is brighter than the sunlight hitting the hermit, and produced a black background. Finding one on an edge of something makes it easier to place an extension tube around it. When working with framers, one of the keys to success is to look specifically for those subjects that are out in the open in a way that allows you to put the framer under and to the right. I cut off the portion of the framer on the left to avoid creating a shadow from the left strobe.

With SLR and digital systems, the same holds true. By finding one on an edge, you are better able to get lower and shoot from a level angle. This gives the hermit a much more powerful appearance and thus gives the photo more emphasis. Shooting downward relegates the crab to a lowly position and reduces the impact of the image.

Plate 32, Brown Sponges

Lighting for drama: These plain sponges are brought to life solely by the lighting. Experiment more with your lighting angles. Start from the front, and move the strobes above or to the side, further from the lens. As you move the strobe to the side, be careful that you do not inadvertently move it closer to the subject. Limitations of the length of your strobe arms may cause you to move the strobe too close to one side of your subject, producing uneven lighting across the scene.

Think of this point: a subject that is twelve measured inches away from you, looks like it is only nine inches away. We also know that a subject that is twelve inches across looks like it is fifteen inches across. Now think of strobe-to-subject distance. A strobe that is held twelve inches away from the subject will look like it is only nine inches away. We visualize this nine-inch distance and we know that it is correct. When moving the strobe to the side, we keep this same visualized distance as we view the strobe to subject distance. However, to get the correct twelve measured inch distance when side lighting, the strobe will LOOK like it is fifteen inches away. That is a big difference from the nine apparent inches that we used in the front lighting situation. So, when extending your strobe in front of you to sidelight a subject, make sure that you are keeping it at the proper distance.

To keep the lighting even, you may need to move it even further away.

Plate 33, Upside-Down Jellyfish

These jellyfish were lit with two diffused strobes held far to the sides to produce more translucent lighting.

Plate 34, Grotto

Shooting light beams: It is difficult to meter in these conditions, so eventually experience became my guide. I used a wide lens so that I could work close and keep the blacks dark, and bracketed the exposures. In this case I used my widest aperture and bracketed the shutter speeds. Even at f2.8, I had plenty of depth of field with my 15mm lens set for five feet.

To see dancing sunbeams, the sky must be quite clear. If the clouds are bright white and scattered, that is still OK—you just have to wait for the sunny moments. If there is a haze in the sky, or if it is overcast, and you cannot see a clear sharp shadow as you stand on the boat or shore, then don't bother looking for sunbeams.

If the water is slightly rough, then the beams will dance. If the water is too clear, the beams may be hard to see. Ideal conditions are windy with blue skies and slightly turbid water.

Plate 35, Cayman Caverns

It is difficult to meter in these conditions, but a spot meter would give you a starting point. Aim the spot meter (set your SLR or digital camera for spot) at an area on the cavern floor where the sunlight is hitting. Then take a few more readings of the dimmest and brightest areas of the scene. You want an exposure that is less than indicated by the deep shadows and more than indicated by the bright light overhead.

If you don't have a spot meter, then you will have to do a little extra bracketing. (By this I mean that you will have to use several different exposures.) Of course, if you are shooting with digital, all you have to do is shoot and then look at the results. If the exposure range is extreme, try setting the contrast lower and shoot again. It may be difficult to see the actual result in the small LCD screen, so shoot at both settings and study the results on your computer later.

Since the beam is important, you must have enough exposure for the beam. If it is a dim beam (i.e. it is small, or you are in deeper water) you may have to shoot wide open, with a fairly long shutter speed. The interior is lit with strobe, which has to be weak enough not to overpower the beam. Since the duration of the strobe is relatively short (around a 1/1000th of a second) the fish and the rest of the photo will not show camera or subject movement; the duration of the exposure is simply the duration of the flash so you can get away with using a longer than normal shutter speed.

In this case, I was set around f4, 1/30th of a second and used my SB105 strobes on 1/4 power with diffusers. With your digital camera and strobes, you can easily dial the strobes to a low power setting.

Plate 36, Christmas Tree Worm

Rim lighting with a second strobe: Study the photo. Where do you think the strobe is? Look at the left side center "shaft." Look at the coral texture in the background. The strobe was held from the left and a little behind the subject to rim light the center and to make the whorl look iridescent. If lit from the front, this would look flat and brownish. I used a flashlight held above and behind to explore what things looked like when backlit and then found that the Christmas tree worm became iridescent.

A second small strobe is on the opposite side, below and from the right.

Plate 37, Spotted Cleaning Shrimp

Rim lighting with a second strobe: Look carefully at the edges of the anemone, especially in the background. Can you see the effects of the second strobe, above and a little behind the subject to produce rim lights and depth? The second light is from the opposite, below and from the right. Neither is from the front, which would have flattened the subject. Look again at the number of shadows all over the photo. The shadows are what give it dimension and depth.

If you are using two strobes, make them work for you. Don't just put one at a forty-five degree angle from the left, and another at a forty-five degree angle from the right. You will only build wonderful shadows and textures with the first, and then destroy them with the second. Make them work for you—put them far enough apart on opposite sides so that you can still toss some shadows into the front of the photos.

Plate 38, Snail Face

Lighting for texture: I saw this snail while working with a photo student, but really wanted an opportunity to shoot it for myself. After the lesson was over, I asked one of my staff to put together a Nikonos, extension tube and a small Ikelite MS50 strobe. The strobe did not have an adjustable arm like the UltraLight arms available today. So I held the snail with one hand, the camera with the second, and held the strobe with my knees.

It took a bit of doing, but I really did not want to use flat lighting for this intricate animal. I wanted the texture of the shell to show in the photo.

Plate 39, Midnight Squid

Herb jumped in the water, panicked, thrashed around a bit, the strobe fired accidentally, and later we found this image on his film.

Now I will tell you his version:

In the dark, Herb was able to approach this squid with his Nikonos and close-up kit. The strobe was angled from the upper left. The key is the angle of the composition—not straight on, and not too much from the side. He set the focus point close to the eyes and the photo is perfect.

Plate 40, Jawfish

Shooting Jawfish: Jawfish are shy, but with minimal patience they will come out of their hole for a photograph. You should use at least a 90 mm lens, preferably even one as long as 200mm, as measured with a 35mm film camera, or its equivalent with a digital system. I held the strobe level with the fish and aimed it upward to reduce the light hitting the bright sand. The fins of these fish look pale and white to your eye, but when slightly side-lit and underexposed, they turn blue.

Even with a big housing, don't forget to turn it sideways for a vertical. By shooting vertically, you can better fill the frame with your subject and it tells the viewer that something vertical is the main subject.

Plate 41, Wrasse

Wrasses do not stay still and stare at you the way snappers and grunts do—they swim rapidly about, and dash here and there. You will need a lens that focuses quickly if you want a sharp image. This was taken with the fast focusing Nikon F5.

Look carefully at the image and decide where the strobes are. You will notice that they are not both just left and right, straight into his face. They actually appear to be coming from the lower left and lower right. That is because I am above the fish, and quickly aimed downward leaning over as the fish swam beneath me.

Plate 42, Golfer

We first had to get these wonderful shorts and a bright hat for Herb. We modified a pole with a Cayman Islands pennant and used the lens cap from a Nikonos 15 mm lens to be the cup. The grouper was just an on-looker who had graced our reef for several years.

I used a 15 mm lens and two SB103 strobes. One strobe was aimed at Herb. The second one was aimed to the right to fire a large SB104 strobe set on slave and held by an assistant. The slave strobe was used to bring out some detail on the caddy holding the pin at the cup.

Ordinarily I would not use a large strobe underwater because they usually do more harm than good, lighting up too much backscatter. However, I was able to have the strobe held far enough to the side to reduce the amount of visible backscatter and still provide a soft highlight on the face of the caddy to help prevent him from blending in with the background.

Plate 43, *Angel in Grotto*

I wanted to use the backdrop of the light beam in the grotto to take photos with models. We used fishing weights strung like beads to look like jewelry. In the first trial, using a concealed weight belt on her waist, Cindy had trouble keeping her feet down comfortably and the weight belt did not stay concealed. We modified the technique by using small fishing weights as ankle bracelets. She wore another one on her waist and one as a necklace.

Cindy is a skilled technical diver and had no trouble being at depth without SCUBA gear. At first we tried to ferry air to her from a diver's octopus air source, but by the time the support diver's bubbles were gone from the picture area, Cindy would soon need air again. We decided to use an air source on a long pole and just hand it to her from a distance. We hung a mask on the pole so that if she needed to communicate she could reach the mask and put it on.

Using strobe light created the wrong effect—it flattened the photo and drew attention away from the light beam and Cindy's hand. To increase the color available for the photo, I used Kodak Underwater film. This film was available for a limited time in the mid 1990s and greatly enhanced the warm reds in shallow water. In this photo it enhanced the soft brown colors of the shell without my having to light up the entire scene with a strobe.

Plate 44, Elmer the Eel

Elmer was an easy eel to work with so I had plenty of time to move my strobes around. After getting the first documentary photos, I moved my strobes further to the sides. This allowed better separation of the subject from the background. Look at the way the strobe on the left highlights the left side of Elmer's face while the second strobe rims him on the right and leaves shadows in his mouth and on his jaw.

Plate 45, Eye to Eye

Strong strobe lighting from below accentuates the implied eye contact between Waldo and me. Sunlight softly rims Waldo's dorsal fin. In a photograph the main points of interest are the brightest, most colorful, sharp, contrasty areas. If the subject has eyes, then the eyes generally become the primary point of interest. Strong lighting from above or from the right would have distracted from the action in the center.

Plate 46, Sponge and Settlers

Creating rim lighting: Two strobes held from the far left and far right create rim lighting on the sides and leave soft shadows in the front.

Make sure that your strobe arms are long enough to hold your strobe to the side or a little behind your subjects. Too many people buy short 5-inch arms for their close-up photography and they lose the versatility that long adjustable arms provide. I personally use the UltraLight brand of arms as they can be easily tightened enough to stay put, yet they are loose enough to adjust quickly.

At the time that this photo was taken, I had one strobe on a homemade "L" shaped bracket, and the second strobe was hand-held.

Plate 47, Sergeant Major

Exploring creative lighting: Whenever I want to work with more creative lighting with fish, I look for the easiest fish to work with. This may include a damselfish protecting its eggs, a fish that is used to being fed, or a camouflaged predator that doesn't move when you approach.

In the Cayman Islands, the easiest fish to work with include the Sergeant Majors. They are unafraid and will swarm around you. The biggest problem is that they move very quickly, so it is like shooting a butterfly in a garden.

I often plan the photo with a stationary object, such as this sponge, for two reasons. The sponge adds color and interest, and it is easier to plan the lighting when you have a specific distance within which to aim and focus.

I set up one strobe to come down from the top, and the second to be from behind on the right to rim the sponge and light the fish. The deep shadows along the left force your eye to stay more to the center of the photo, and further identifies the main points of interest.

It took several tries, of course, to end up with a photo where the fish is nicely aligned with the edges of the sponges.

Plate 48, Manatee

This is an excellent example of how to **avoid backscatter in dirty water**. I started with a single strobe on a fixed arm on the left side of the camera. The problem was two fold—the water was dirty and I wanted to light the manatee's face, not his back end. I had to handhold the strobe. I crossed my left arm across my chest and aimed the strobe from as far from the right as I could reach. To reduce backscatter, I feathered the strobe by aiming the strobe beyond the manatee so that the edge of the beam, rather than the center of the beam, lit the manatee.

I aimed the strobe from below and let the sunlight light his face from above.

Aiming at the apparent image: When aiming the strobe, don't forget that subjects underwater look closer than they really are. If you aim the strobe at this apparent image, you will actually be lighting a lot of water and the particles in the water, and missing the actual subject. Your photos will have bright foregrounds and dark subjects, or the light will be more apparent on the right side of the photo and less on the left even though your strobe is on the left.

To light the real subject, aim one third further beyond the subject that you see. (A subject that looks like it is three feet away is actually four measured feet away.) To feather the lighting, you must now aim even further beyond the subject that you see. It will often feel quite wrong. It is one of the few times in life where I would say that if it feels wrong, you are probably getting it right.

Plate 49, Manatee in the Sun

When **composing with the ball of sunlight**, it is important to understand the role that bright lights play in composition. The viewer's eye is drawn to the brightest, sharpest, most colorful, most contrasty areas of an image and if the subject has eyes, the viewer is drawn to the eyes.

In a photo like this, the viewer is drawn immediately to the bright ball of sunlight and this happens to also be the area of greatest contrast and sharpness and thus directs our attention to the eye-to-eye interaction of the diver and manatee. Although we cannot actually see their eyes, we know that they are looking at each other.

Had I taken the photo from my original position, with the sunlight near the upper edge of the photo, the viewer would be distracted between choosing to look at the bright light or the interaction. Understanding this, I swam as quickly as I could to the position that placed the sun directly behind the front end of the manatee.

I also used a fast shutter speed and wider aperture to accentuate the streaks of light beams.

Plate 50, California Serpulid

Focusing with close-ups: When taking extreme close-ups, you must decide exactly where you want the plane of focus. The depth of field at f22, with a 1:1 subject is around 3/16 of an inch. Thus, you cannot have both the purple "trumpet" and the whorl of brachioles sharp at the same time. In this photo I chose the whorl to be the sharpest part as the whorl has more tiny detail. The trumpet is composed of a larger mass of solid color and still looks good even when it is a little blurry.

I was not likely thinking of all of this as the cold seeped into my wetsuit and the surge buffeted me about, but I instinctively placed the framer of my Nikonos extension tube around the whorl and carefully centered it. With an SLR you must focus first, hold the shutter lever partially depressed or use the focus lock button, and then re-compose to take the picture. With digital monitor focusing, it is more difficult to see the image. However, with digital systems depth of field is less critically noticeable. The pixel element is so much larger than a grain of film that the loss of sharpness is not as apparent. In other words, the pixel is already so large that whether the light is focused to exact points on a single pixel, or almost to exact points, the pixel doesn't change.

Plate 51, Pink Feather Duster

These worms grow in clusters and composition is deceptively difficult. When shooting several at once, you need to choose one to be the main point of interest and look for a composition that accentuates it. Sometimes I gently touch certain ones so that they pull in and get out of the way.

Read the lesson for plate 50, as it pertains to this photo also.

Plate 52, Curious Sea Lion

I am not an expert at shooting sea lions; this short encounter is one the few times that I have had the opportunity to photograph them. Like most of you, I wish that I could do this more often.

Several problems must be confronted: sea lions often move quickly and constantly, so it is hard to anticipate the proper-metered background exposure. If visibility is mediocre, it is difficult to even see them coming. And if the lighting is dim, one cannot get good contrast. My conditions were not terrible—we were in shallow, relatively bright water.

Plate 53, Sea Lion Tug of War

The smaller females were feeling playful and wanted to chew on anything rubbery on the SCUBA divers.

I used a 15mm lens and a Subsea Mark 100 strobe. (The listing of SB103 in the book is an error.) To avoid backscatter I tried to keep the strobe feathered beyond the apparent and even the actual image. (See plate 48 for more info.)

While I was being dragged, my first photo was taken in haste and the hand-held strobe was aimed at the apparent image, lighting my leg and lots of backscatter. But in the second image I aimed the strobe more to the left and down and away from the center. The backscatter was eliminated. You will also notice that the light was bounced from the bright sand to highlight the underside of the sea lion. I would like to say that I planned that, but it was fortuitous and I take full credit for it anyway.

Plate 54, Sea Lion in my Face

I was limited to 1/60th of a second sync speed with my strobes, but more modern cameras, especially the digital SLR cameras, allow you to use higher speeds to stop the action while still using strobes to add color and highlights. With digital cameras, you can simply dial up a faster ISO when you need it, to allow you to use faster shutter speeds and smaller apertures, and even dial up a little more contrast. Now all you have to do is help to preserve these animals so that you still will have subjects to shoot.

Don't forget to join three environmental groups.

Plate 55, Orange-Fin Anemone Fish

Side lighting accentuates the scales of the anemone fish. I set the strobe for TTL, as usual, but chose an aperture based on my estimated full flash exposure value of f22. As the fish darted toward the strobe I took the photo. Since it was difficult to assess just how close he would be at the moment I shot, I depended on the TTL to help me control the exposure. A small aperture kept the background dark.

To keep the background dark when using a digital camera, where your smallest aperture is around f8, keep your ISO setting as low as possible and your shutter speed as high as possible.

Plate 56, Anemone Fish on a Tire

This is a simple photo but I like his straightforward expression.

When **photographing fast moving fish with an SLR**, try the following:

1. Use a fast focusing camera/lens combination. The newest SLR cameras are generally faster than their predecessors.
2. If your lens is not finding the focus fast enough, manually focus on the part of the anemone where the fish goes the most often or where he looks best. As soon as he enters the scene take the picture. By the time the photo is taken he will be fully into the area. Since the timing is so critical, just keep shooting.
3. If you can open your other eye, hold the camera steady and watch him coming so you can anticipate him better. If you are only looking through the viewfinder, you cannot react to the fish's entrance; you will see him darting past and out of the frame before you can respond.

Plate 57, Thai Gardens

Depth of field with wide-angle lenses: Many people mistakenly think that ultra wide-angle lenses have lots of depth of field. The problem is that depth of field is reduced as the picture area becomes smaller, the focused distance gets closer and the aperture gets wider. With an ultra wide-angle lens, you must work very close to fill the frame, and you often want a rather wide aperture to get a blue background.

This subject was about fifty feet deep and the blue background was dim. I needed to open up to around an f5.6 or f8 (I don't keep detailed records of every f stop) and I was focused down to around half a foot (around twelve centimeters.) As with all SLR cameras, there is no depth of field scale on the lens or camera that we can use underwater. I also do not know of any that allow you to use the preview button and assess your depth of field as you shoot. Consequently, I needed to guess just where my depth of field started and ended.

I wanted the fish very sharp, and I wanted to accentuate the distance between the colorful soft corals in the foreground and fish in the middle ground. I set the focus for as close as possible and moved in until I was almost touching the soft corals in the foreground. I took several photos changing my focused distance from the closest setting to slightly further and further away. The total depth of field at these settings is just a few inches deep when focused to the minimum setting, so I gained some depth of field by focusing a little further away.

When you purchase a lens, look at the instruction sheet and study the depth of field scale. Make note of how much depth of field you have at minimum distance at e.g. f8 and f22, then how much at 1.5 feet (50 cm), and at 2 feet (60 cm). This will give you a much better feel for where your focused distance should be.

Plate 58, Fields of Grass

This is essentially the same lesson as for plate 57, except that I missed getting the eyes in focus. As the surge was throwing me around, I moved in too close for the depth of field and the eye of the scorpion fish is not quite sharp. Why is it in the book? Because I still like the photo and it is my book. I get to put in it whatever I like.

Plate 59, Anemone Fish in White

Using TTL and white subjects: To keep white subjects looking white, you must be careful when using TTL. The TTL exposure system will quench the strobe light as soon as it detects enough light for an average (gray) exposure. It does not know that you want this to be a bright white anemone rather than a tan one; it shuts the strobe down early before it allows a white image that it considers over-exposed. You can open the aperture but the TTL system will just shut the strobe off earlier and earlier.

To maintain a bright white image when using TTL, adjust the ISO to a lower film speed or the exposure compensation dial to plus 1 or 2. When using manual exposure, you actually need to do the opposite. You need to reduce the strobe light to prevent totally blowing out the image.

With digital systems, just shoot, adjust, and shoot till it looks right. Many digital cameras have a highlight indicator that blinks black and white in any areas that are over-exposed. You cannot easily save over-exposed details in a digital system but you can easily turn them white in photo shop if you have underexposed them a bit.

Plate 60, Pink Anemone Fish

I wanted the photo to look like a watercolor—pale and not quite realistic. As with plate 59, I bracketed my exposure compensation dial on my F5 to allow a full stop to a stop and a half more light from my strobes. With my F5, I use my strobes on TTL and use an f-stop calculated for the full flash; setting the strobes on TTL helps to fine tune the exposure. It is difficult with an SLR to anticipate the exact strobe to subject distance as you shoot, so I depend a lot on the TTL. Unlike TTL with some earlier cameras such as the Nikonos V, TTL is extremely accurate with cameras such as the Nikon F5.

Plate 61, Pink Anemone

I loved watching these schools of minnows flow above the rocky reef, but most photo angles showed only a wall of silvery dots--I needed some color and shapes.

Looking for subjects: Much of the challenge in producing a good photo is in knowing how to search for a good scene. Depending on what I am looking for, I often don't see anything else. If I am looking for a particular type of Christmas tree worm, I won't see the hermit crabs. It is like scanning a page for a particular name.

Swimming among the silver schools of fish along the rocky outcroppings, I looked for a colorful foreground for the minnow photo and found an area with some anemones. More searching yielded this large pink one on a sponge colored rock. It was high enough that I could get below it for an upward photo into the sun.

I used two strobes to light both sides of the large rock.

Plate 62, Anemone and Diver

I had been a contributing photo editor for Skin diver Magazine for almost eighteen years, (1970 to 1988) and thus many of my photos involve the interaction of divers and the marine environment.

I metered for the blue water, and adjusted my strobes to balance the exposure. (In other words, if the meter read f11, I held my strobes at the distance needed to expose the anemone at f11. This information is printed on a chart on the side of my strobe. Even though I may set the strobes on TTL, I still want to hold the strobes as closely as possible to the proper distance for a full flash exposure.)

The model is Cindy Probeck, a friend and long time model who, on occasion, can go on a trip with me and pose. I used an ultra wide lens focused just a little past the anemone to gain depth of field. (See plate 57.) Because I am aiming upward, I can use a relatively small aperture to gain depth of field.

Auto focus, depth of field and wide-angle lenses: When using my auto focus, I back up a few inches, focus, hold the shutter lever halfway down to maintain the focus, and then move forward a few inches and shoot. If I had focused on the front of the anemone, I would have wasted good depth of field into the foreground where there is no subject, and my depth of field would be grossly reduced into the background where my important diver is. (The diver is important because there is a bright light behind her. If she were just in a dim background, having her in focus would not be so important.)

To maximize useful depth of field, I simply focused a few inches behind the anemone fish. This could also be done manually just as easily if you have the capability of using manual focus with your wide-angle lens. Some housing/port combinations, especially those for zoom lenses, do not allow manual focus.

Plate 63, Moorish Idol

Adding a point of interest: Many scenic photos are lovely to look at, but without a recognizable point of interest, many viewers just say ho-hum. Fish are one of the best recognizable points of interest that are universally appreciated, and big colorful fish are better yet. Little brown ones will rarely suffice. I loved the scene between the lifeboat davits of the *Fujikawa Maru*, but there was a big empty gap in the center—I needed a Moorish Idol.

The fish was so important that I simply set out to get him into the scene. I waited, I nudged, I chased, and I waited some more. I got another tank of air, I followed him about, I encouraged him along, and in the late afternoon he finally went up the davit, I got ready, he dashed across to the other side and down he went. I got off two shots, but they were worth it. Now, of course, a digital photographer could just use Photoshop to digitally stick one where it was needed.

Plate 64, Drill Press

Above water an old drill press would be trash, but underwater it is treasure. I fell in love with this machine as soon as I saw it. Like the arched neck of a heron ready to pounce on an unsuspecting fish, the drill is perched above the chosen hole, ready to punch through whatever is in its way. (Never mind that the belts that give it its energy are dangling helplessly to the floor.)

To avoid letting my bubbles hit the ceiling and start a rain of debris in my scene, I held my breath as I stuck my head into the room to take the photo, then backed out of the room to breath. As I pursue closed-circuit rebreather systems, shooting within closed environments should be easier.

Plate 65, A Little of Everything

Pushing slide film: To get enough depth of field to take this extreme near/far wide-angle photo, I used ISO 200 film pushed to ISO 400. By aiming upward toward the sun, I was able to set for a very small aperture (probably f16 or f22) and gain considerable depth of field.

When pushing film, all you have to do is decide in advance that you need a faster film than the one you have. Suppose you have a 100-speed film and need 200. Set your camera and exposure meter, if you use one, for ISO 200; use a strobe exposure chart based on 200 and shoot the entire roll as though it were 200. In other words, you are actually underexposing your ISO 100 film by one f-stop.

To compensate for the one stop under exposure, the film needs to be developed longer so it will turn out looking correct instead of underexposed. This is called push processing. You are asking the processor to push the film one stop. If you underexpose the film by two stops, as though it were ISO 400, then you would need to have it pushed two stops. If you overexposed the film, it would need to be pulled—it would be processed for a shorter time than normal to prevent it looking overexposed.

Plate 66, Halloween Sponge

Don't pass up humorous opportunities: I was coming up from a deep dive on a wreck in Chuuk when I saw this sponge. I had an ultra wide lens and black and white film. After our normal stop I went up to the boat and changed cameras so that I could go back down to the shallow sponge and shoot it with a close-up lens and color film. (As I think about it, it may have been cute in black and white. Since the contrast range is not critical, I could still scan it and simply drop out the color.)

Plate 67, Lionfish

I had a wide-angle lens on when I saw this lovely lionfish. I set the lens for as close as it would focus (about seven inches), metered for a dark blue, set the strobes accordingly and took the photo. I got down as low as I could to the deck of the sunken shipwreck and aimed upward to get the sun in the background. It was an overcast day so the sun was not a shimmering ball of light. In most respects, the duller ball of light was better because it did not distract attention away from the fish as much as a bright sun would.

Also, by getting as low as possible, I was able to shoot from the same level as the fish and put him at an equal height to the viewer. Shooting from above with a downward perspective was not as interesting—it did not give that feeling of equality, of being eye-to-eye with him. Even nudibranchs and other creatures look more dramatic and dynamic when photographed from their level, face to face.

Plate 68, Lionfish Row

Using rechargeable strobe batteries: These lionfish were lined up for dinner, but my second strobe died and I had to shoot with one strobe. I was not certain that the second strobe had died and continued to shoot with my single strobe well out to the side. This created uneven lighting—the lionfish on the right are much brighter than the fish on the left. The photo is one of my favorites, so it was worth fixing it up in photo shop to even the lighting. They look like a bunch of rascals hanging out at the bar.

The difficulty with this photo was that it was taken quite deep and I was running low on air and bottom time.

Your lesson for this photo is to keep your strobe batteries charging at every opportunity and use them fresh from the charger. Don't let your rechargeable batteries sit idle for a few days before you use them, especially in humid environments.

Use a battery tester to test each cell before you use it. You may easily get a dead cell that would otherwise be impossible to isolate. Your charger may have indicated that the cells were charged, each cell may even feel warm, but one cell may only be able to power a few flashes before it dies. You charge up the set again, but again you get fewer flashes than expected. When you take them out of the strobe, test them to find the dead one and if you have tried once before to recharge it, and it failed again, throw it out.

Plate 69, Coral Mouth

It is easy to be so engrossed looking for strange creatures on an exotic reef that you overlook the simple and the beautiful. People have an obsession with patterns, and when they find them in unexpected places, they are valued as beautiful. Use a flashlight to find the ones with interesting purple or pink patterns. Compose for classic composition, or break the rules and place the mouth at the bottom or a corner. You are the artist—you determine what you want your photos to say.

The problem with exploring art underwater is that the area is still relatively new to the viewer. In photos where I have broken the rules and placed the mouth half out of the frame, viewers just assumed that I didn't know how to use my camera or my extension tube framer and that the photo was an example of lousy technique. When we become more sophisticated and view the subject as a unique piece of art, we can more freely break the rules and create as we choose. For now, people just want to know what it looks like for real underwater, and they are not ready for surrealistic or abstract representations of reality.

Plate 70, Red Anemone

Use your flashlight to find which subjects underwater would become a brilliant color when lit with strobe. This same composition with a brown anemone would not be enjoyed as much as this bright crimson one. The composition is a simple "C" curve with the base at the bottom. You can study your own feelings about composition by turning the book and looking at this photo from different orientations. Then hold it up to a mirror to flip it in the other direction. Notice how you feel as you see it changed, and then choose the orientation you like best. See if you can define why you like it that way.

Part of our feelings about composition has to do with the way we read. English speaking people read from left to right, top to bottom, so we tend to prefer photos where we enter the photo on the left and leading lines take us to the right. We like the heaviest part of the photo on the bottom and balanced left and right so that we don't have the feeling the photo is going to tip to one side. By balance I mean the amount of dark areas compared to light areas. Our eyes travel around the image looking for the main point of interest. In a photo like this one, there is no singular point of interest. The value is in the abstract pattern of the tentacles against the red. That is why there can be so many interpretations of its composition.

Plate 71, Hermit Eyes

While I recommend that you do not touch or handle any creatures underwater, there are a few of them that we can move with impunity, providing that we follow all of the rules described in the book: i.e. we don't hurt it, we protect it, and we return it to its exact original position. Hermit crabs are the easiest to handle. This one was active and ready to come out even as I studied it, so it was no problem holding it above the camera for an upward view and a blue background.

The composition is classic: the eyes are sharp and are the main points of interest. The shell is at an angle parallel to the eyes and the body leads out at a corner. The shell detail behind the eyes creates a gentle curve to the bottom to create an implied oval. All lines lead to the edges and back to the eyes.

Strong side lighting highlights the eyestalk and allows a deep shadow inside the shell.

Plate 72, Reflections

Shooting reflections: When taking a reflection photo, you need follow only a few rules:

1. If you can see the reflection, it can show up on film (or media). It is easiest with an SLR. With a viewfinder camera, make sure that you adjust for parallax and perspective as the reflection depends on the angle of your view.

2. Focus on the actual subject, not the reflection.

3. Aim the strobe at the actual subject, not the reflection. Light the part of the subject that is being reflected. In this case, the strobe is aimed straight at the fish, and the upper side of his head that shows in the reflection is getting bounced light. If this were a diver (XXX insert diver photo) you have to be careful to aim the light down into the diver's face. It is the light from the strobe on the face that is being reflected off of the air pocket. Don't light the reflection in the pocket of air.

4. Be careful whenever you hold your breath while SCUBA diving. You will need to control your breathing while under the overhang to keep the air pocket smooth and reflective. If you like the abstractness of a slight ripple, experiment with your breathing and timing for the photo. If you want it perfectly smooth, use a rebreather system.

Plate 73, Pouting Squirrelfish

Fish portraits: I do not often shoot fish—not just because they are so darned difficult to work with, but after all of the effort, all I usually end up with is a fish photo. I am not Paul Humann—he has a photo of every Caribbean fish. If I need to see a fish photo, I will buy one of his terrific books.

I like fish pictures that can make me feel something—especially a chuckle or some anthropomorphic response that the face elicits. This guy looks like he is pouting, so I pursued him. It is a great plus that he is also quite colorful. The big sad eye and down-turned mouth give him a feeling that I cannot get from most butterflies, grunts and parrotfish.

I am not the one to tell you how to shoot fish; I fail miserably at it because I don't like the time it takes to get one good photo. You have to be patient, patient, patient. You have to understand the fish and learn what it likes to do and where it likes to be. It helps to have an SLR camera with a long lens (60mm, 105mm and 200mm), clear water, two good strobes and a dim sun. Newer digital cameras with a monitor back are usable if the lag time is minimal. These cameras allow you to zoom as needed to fill the frame with the fish of choice.

Most people prefer a 45-degree angle for the average fish portrait because angles create the illusion of motion. But straight on works, also, as on the cover, and with the right lighting or composition, a flat view from the side can be fine, as in plates 55, 100 and more. Since we have a particularly strong compulsion to face things eye to eye, we do not place high value on tail shots. In reality, a tail shot should count just as much as a head-on shot, but they just don't.

Plate 74, Everyone Sees Things Differently

Don't destroy natural light shadows: My first impression when I saw this was that it was the caricature of a man with a big nose and a large grin. Then I saw the catcher's mitt. Either way, it was important to keep the natural light shadows.

The same lesson in lighting can apply to many things. For example, much of the beauty of the mermaid in front of Sunset House, Grand Cayman, is the way the sunlight highlights her face and hair. Using a strobe flattens the image and destroys the dimensionality. By raising your strobe high above the mermaid to accentuate what the sunlight is doing keeps the lovely contours intact and adds the warmer colors of the strobe light.

Look for the sunlight on other subjects as you shoot—gorgonians, wrecks, corals, etc.

Plate 75, Blue and Gold

Exploring patterns and cropping: Using a long lens and a medium power strobe, it is a fun self-assignment to just shoot fish patterns. I had a blast doing it. I shot side views, tails, fins, anything that had a pattern. Being a University of Michigan graduate, I especially liked the blue and gold.

At first I liked the touch of yellow from the tail and the small parasite, but after looking at this photo again, I think that I should have cropped out the tail and parasite and gone just for the stripes. Take two pieces of paper and crop out the left and right sides and see if you like the photo better. Continue to explore your own tastes by trying other croppings of photos like this one.

Plate 76, Squirrelfish Geometric

Challenge yourself with self-assignments: This is another in the self-assignment of fish patterns described in plate 75.

When diving in the same areas over and over, I sometimes run out of creatures to shoot, so I change techniques. On one trip, I shot only 200mm photos; on another I used a 1:1 extension tube and shot coral patterns (see plate 77), on others I concentrate on black and white. It just depends on how I feel and what seems to be the most fun.

Plate 77, Happy face

I spent quite a while studying the polyp patterns of coral. I found heart shaped ones and lots of faces.

One vs. two strobes: The value of this one is in the deep shadows of the right eye and mouth. Had I used two strobes, the depth of the face would have been lost; the second strobe would have destroyed the shadows. This is a lesson easily applied to many situations. Just because you may have two strobes does not mean that you should always use both. Get in the habit of thinking about just using one strobe, and add the second when you need it.

In reality, you will want the second strobe most of the time, and you will likely turn this advice around; you will use both strobes most of the time and turn one off when you don't need it. However, most photographers get so caught up in the photo that they forget that turning one strobe off may help the photo. (Actually I don't turn the strobe off, as I would forget to turn it back on again. Instead, I aim it upward or backward when I don't want it. Then I can't miss seeing that it is not aimed right for my next set of photos if I wanted it back on.)

Plate 78, Pink Polyps

Work in progress: I loved the way these tiny polyps showed up on the slide, but I am not sure how they will play printed on a page. The composition is weak, so I hope the polyps carry the image.

Depth of field is so limited with this tiny picture area that I had trouble getting enough of the polyps sharp. I needed to be absolutely steady so that I could hold the camera parallel to the field of "daisies." If the camera were at the slightest angle, the polyps wouldn't all be sharp. I took some at an angle, thinking that the perspective would look more interesting as the polyps in the background and foreground became blurrier compared to those in the narrow plane of focus. It was not better—the polyps just looked blurry and reduced my interest, so I stayed with shooting them as flat as possible to maximize the numbers in focus. Of course, these polyps do not all lie in a flat plane—they are on hills and valleys, causing shadows and blur and bedeviling my composition. This photo is a work in progress.

Plate 79, Leather Coral

Change your point of view: As you swim along any dive site, don't forget to look upward. Put your camera to your eye and look around. Look for the sun, look for new views and perspectives. This is easiest, of course, when you can swim below subjects along a wall or edge of a wreck. The bright blue provides a less distracting background, and the subject itself changes character.

The personality of this little leather coral changes totally, compared to a normal view from the side as seen in plate 80.

The photo procedure is standard—meter for the blue and adjust the strobes to balance. Two strobes were used from the right and left. I did not use extreme side lighting, as I just wanted the whole underside fully lit yet lightly textured.

Plate 80, Red, White and Blue

Shoot-move-shoot... I started with a normal level angle photo of the white leather coral against the red fan. Very often, when I see a scene that I like, I just take the photo. Once I get that out of my system, I sort through my settings and double check my exposure calculation. I take another photo and then ask myself what else I can do to make it better. Here is where the fun begins, and I recommend this technique to everyone. Shoot—change something—shoot again—explore and shoot some more.

In this case I started getting lower and lower and then after about four photos I discovered the surface overhead! I realized that I could actually low enough to put the bright surface right behind the leather coral. I did not see that at all until I started to look for new views.

Plate 81, Another World

I briefly owned two very large and powerful strobes—Nikon SB104s. I thought they would be great for photographing large subjects at a long distance. However, I found that although the subjects were well lit, I also lit a lot of particles in the water between the lens and distant subject and the photo was useless. I gave the strobes away.

On this rare occasion, before I gave them up, I was enchanted by a very large scene in rather clear water. I was able to hold the strobes far enough to the sides that backscatter was held to a minimum and the photo showed everything that I wanted. To enhance the three dimensionality of the photo, I feathered the strobes out so far that they do not light the foreground.

As in plate #63, I waited for an exotic fish, a Moorish Idol, to enter the scene. It produced an unreal scene, that although it is not my regular style, I like it.

Plate 82, Two Scorpions

Break the rules: I wanted the photo of the two scorpions and struggled with the sea whip in the foreground. There was no way to see the nose-to-nose viewpoint of these fish without getting the whip in the photo. I tried putting the whip in the center, I tried a vertical, and I tried to avoid thinking about the small knife that I carry for cutting fishing line tangled in the coral.

Finally I just accepted it and let it finish its journey out of the photo at the corner. I could clone it out in photo shop, but I liked the tension and conflict that it produced. It is a stark distraction from the two fish, but it gives a feeling of depth to the image that is different from the usual approach. A broken rule can often be interesting.

Plate 83, Fish in a Bottle

Lighting ratios: This is a typical treasure on a muck dive. Muck dives are dives on sandy, muddy or gravel beaches that are sometimes littered with trash, or have a few isolated rocks or coral. As is often the case, a bottle is a perfect home for a small creature.

The composition is classic—a circular bottle and an oval face. The eyes are sharp and the mouth gives it character. Uneven, two-strobe lighting allows detail on both sides of the face; the eyes and mouth need no distractions from side or back lighting. I held the left strobe closer than the right to provide a natural shadow on the right side. You can do this by placing a diffuser on only one of the strobes, or with the digital adjustable strobes, such as the Sea and Sea YS90DX or with the Light and Motion ROC system, dial one strobe one stop weaker to allow a nice lighting ratio.

This photo was taken at Gavutu, a Japanese World War II seaplane base. The diving here was destroyed in 2003 when the area was fenced off to hold up to 200 dolphins in preparation for sale to the captive dolphin entertainment industry.

Plate 84, Clean Behind the Gills

Telephoto lenses: Damselfish are easy to approach, but they move rapidly. Many fish slow down when they are near a cleaning station. Set yourself in a good spot where you will not damage the coral and watch the cleaning station. As the fish become more accustomed to you, they may stay longer being cleaned.

Use a long lens, such as a 105 or 200 mm with 35mm film, or an equivalent with digital (such as 60mm to 130mm with a Nikon D100) so that the fish will fill the frame from a few feet away. Use long UltraLight arms (two eleven inch segments) set out to their fullest extension so that you are not highlighting the particles between the subject and the lens. Don't forget that the fish is further away than it appears to be, so make sure that your strobe is aimed at the real and not the apparent subject.

Now all you have to do is be quick! Focusing is the hardest part because they often move faster than the lens can see it. Long SLR lenses often search for a sharp focus by going out to infinity and back to minimum and then out to your subject whenever you accidentally aim the focusing point into the background.

I find that using manual focus is easier with long lenses. When you are looking through a camera with a long lens that is not focused at the subject distance, the image is so blurry that you cannot even see that the lens is aimed at the subject. You have to work with the focus and camera aim at the same time to get the photo. When you use manual focus, you can maintain an approximate focus even when the fish moves away from your focusing point. Thus, you can still see it and track him until you want to refocus and shoot.

Some photographers like to use continuous focus, but that drives me crazy; I invariably want to shoot right when the lens is searching into infinity and back and by then the opportunity is gone.

Plate 85, Open Wide

Controlling movement: This huge grouper has a wonderful face. If I approached while moving rapidly in the water, he would have bolted. By barely moving, looking away, not aiming the camera right at him until I shot the photo and then aiming the camera away again, he tolerated me long enough for me to take two photos.

Test yourself the next time you dive with your camera. Can you lie perfectly still while holding your camera up to your eye (or your digital camera in front of you) without moving your hands at all—not even a little bit? If you are swinging your hand through the water to keep from sinking or falling to one side, then you need to re-balance.

1. Wear just enough weight that you can rise off the shallow bottom by breathing deeply in and out and without air in your BCD.
2. Wear a BCD that wraps air around you, rather than one that has air wings in the back and pushes you forward as you inflate it. With the air in a big open bubble behind you, each time you change positions, the bubble moves and because it is so far back there, it has a lot of leverage. The jacket BCDs, with a thin layer of air in front, at your shoulders and in the back, provide more stable support and are much better.
3. Avoid integrated weight systems. The weights are far from your body and create too much leverage compared to those on a belt next to your body. They are too far forward and too high in most systems to lend themselves to providing stability. If you wish to kneel and lean forward, the weights will now be forward of your knees and cause you to need your hands to keep from pitching forward.

You want your center of gravity, including your camera, to be in the center of your torso. Think of a point behind your navel and imagine being able to pivot your body on any plane around that point. You should be able to float on your side, on your back, with your fins high or low, and do so without effort or without having to fan the water with your hands or fins. (I am assuming that the water is not moving for this ideal starting point.)

Plate 85, continued

4. Wear your weights on a belt so that you can adjust their position to suit your needs. The heavier your camera is, the more important it is to place the weights low toward the center of your back.
5. Use ankle weights if your feet keep floating above your knees. This will especially happen if you have a heavy camera, or if you wear booties.
If your camera floats, attach weights like the ones golfers attach to their clubs. It is very difficult to hold a buoyant camera absolutely steady. Also, reverse some of the above advice regarding weight placement.

Plate 86; see plate 87

Plate 87, Blue Meal

Documenting the lives of marine creatures is as interesting to me as creating art from the scenes I find. Watching this trumpet snail eating a blue starfish was fascinating. I was interested in photographing it clearly, but without disrupting the behavior. I took the first photos with standard lighting, showing the scene the way I found it.

Because snails are not only slow to respond, and they don't really care if they are moved, I felt that it would be OK to see how it was actually eating. I lifted it up and turned the animals over, took a few quick photos, invited the others in my group to take photos, and then returned the trumpet to his starting position. It didn't flinch or change its grip on the blue starfish.

It helps you to know what to document if you understand the biology of the animals and plants that you are diving with. I highly recommend that you peruse the guidebooks and read about each family group. There are creature features in most of the diving magazines, and there are numerous marine life books that would be good to read. For an easy to read over-view of the workings and interactions within a reef community, I highly recommend Dr. Richard Murphy's book "Coral Reefs, Cities Under The Seas".

Plate 88, Blue on Blue

Composition by cropping: The main composition decision for this photo was how close to focus and therefore what part of the starfish would be included in the photo. With an adjustable 60mm micro Nikkor lens, I could have backed away and included the entire starfish, or moved in even closer and photographed only the shell with a little blue around it. I chose to include enough of the leg and a hint of more legs so that it was clear that this was a blue starfish, yet the shell is still big enough to be seen clearly.

One strobe is side lighting from the upper left to rim light the upper edge of the leg while the second strobe is coming from the far right and creating texture throughout the leg. Notice the strong shadow to the left of the shell; the right strobe is closer and brighter. The upper left strobe is not destroying the shadows created by the strobe on the right.

Plate 89, Yellow Christmas Tree

Shooting your own style: I have photographed hundreds of Christmas tree worms, but there is always one more view. Don't forget that of all of the Christmas tree photos taken around the world, the best one is yet to be.

On this particular trip I was using a 105 with a 2X teleconverter. I started shooting critters, which is what everyone seems to do with their long lenses. But as you may have noticed, I am not solely a critter photographer—I love seeing new creatures, and I will invariably take some documentary photos to help me remember it, but if it is not lovely to look at, I lose photographic interest. (I don't lose biological interest—I will avidly watch the behavior or try to figure out what it is and/or what it is doing, but I won't try a dozen lighting angles on it.)

Anyway...after shooting weird shrimp and shy fish, I went back to my own style of photography. I wanted to photograph how I felt, not what I saw. Many weird creatures are just weird creatures, but not something that I would want to hang on my wall. When I found myself looking upward at this lovely yellow Christmas tree worm, I had to shoot it.

The problem here is the reverse depth of field. Ordinarily I would recommend that your camera be somewhat parallel to the main points of interest to include all of them within the depth of field. If I held my camera parallel to the whorl, the surfaces facing the camera would all be sharp, but the perspective would be the normal view—slightly downward. With the upward view, the bottom whorl looks larger than usual because it is closer to the camera. The second and third whorls are more within the depth of field and the smallest spirals at the top are well beyond the depth of field. I had no choice; this is the first upward Christmas tree view that I had ever seen and I was willing to sacrifice sharpness for composition.

Plate 90, Fan Worm Abstract

Using a teleconverter: The same lesson from 89 can be given here. I am exploring sights that are good for the 105 and 2x teleconverter.

A teleconverter is a lens system that fits between a lens and the camera body. By moving the lens further from the body, it makes the lens longer. Thus, a 105mm lens becomes a 210mm lens with a 2x teleconverter. The 2x refers to the bellows factor discussed at plate 15. By moving the lens, the effective aperture is smaller than the aperture listed on the lens barrel by two stops. If the lens is set for f8, in effect it is now an f16.

Unlike a simple extension tube, teleconverters for modern lenses must transmit lens data and focusing capability between the camera body and the lens. They also have glass elements to help keep sharpness throughout the focusing range.

When using a teleconverter in a housing, you will have to add an extension ring to your standard flat port, and you will have to use a new set of lens gears if you wish to use the manual/auto focus capability. Since it is generally easier to use long lenses with manual focus, make sure that you can get a manual focus gear for use with the teleconverter.

Plate 91, Mug Shot

This is not just a critter photo, it is truly abstract art, except I am not the artist—the fish is. I am just putting it to film. The strobes are both side lighting from the lower left and right to provide plenty of texture and shadows.

Get your cropping tools out and see if you like it cropped more off the top and bottom. I would crop to the bottom of the down-turned mouth and an equal amount off the top.

Plate 92, Courtship

Lighting for separation: Lighting flat subjects lying on the bottom is difficult because you need to produce separation of the subjects from the surroundings.

Place the strobes on the bottom so that the beam skims across the sand and sidelights the subject. All of the texture in the face of the buried devilfish would have disappeared if I had held the strobes in their normal 45-degree position. If you wish to light the subject and not the bottom, as in plate 40, aim the strobe upward so that just the edge of the beam catches the main subject without lighting the bottom.



Plate 93, Soft Corals

The key to many, if not most, if not almost all, underwater photographs is to get close. Because Herb is using a wide-angle 15mm lens about 13 to 18 inches (45 to 50 cm) away, he is able to get lovely colors and detail on these soft corals.

Herb used a medium contrast slide film, Kodak Ektachrome E100S, so that the colors are softer than they would be with more contrasty slide films such as Kodak Ektachrome 100VS or Fujichrome Velvia 100.

I like the classic composition: a main, brighter soft coral in the foreground, tapering in a triangle to the right to progressively smaller corals in the background.

The lesson for this photo is to chose friends that like to go diving and take pictures so that you can stop and shoot while the rest of the guests on the dive boat zoom this way and that and leave you and your buddy to contemplate your subjects.

Coming soon: a discussion of PARALLAX when using viewfinder cameras.

Plate 94, Nudibranch

This is a simple photo made better by exploring the options available. The first photo was taken a little closer and aiming slightly downward. As I became more interested in this nudibranch under a ledge, I noticed that I could place the nudibranch against the far opening of the ledge. I worked with placing the nudibranch in the lower portion of the opening so the blue created an interesting pattern on the upper portion of the photo.

I opened the aperture until I was able to get a blue background, and then depended on the TTL to control the strobe. If I did not have TTL, I could have lowered the power setting on the strobe, added a diffuser and/or moved the strobe further back to the proper distance for the more open aperture.

Plate 95,
See Plate 96

Plate 96, Eight-armed Love

The 60mm lens is a narrow lens that allowed me to shoot these octopi from further away than I normally would. Shooting closer would have been better except that it might have disturbed their activity, but shooting from so far away added a little cyan color from the sunlight and extra water and particles between the subject and lens slightly degraded the image. Fortunately I did not have my 105mm lens on, as that would have forced me to be much too far away. I know that a lot of photographers like to take only their 105 in the water, but the wider 60mm lens can be just as exclusively valuable.

The lesson here is simple—because I had to shoot from so far away, (almost three feet), I put my strobes as far to the sides as possible. I remained quiet and just let the octopi do what they wanted to do, while I quietly took photos. I did nothing special with the lighting, as I wanted to light all of the activities.

In photo shop, I darkened the bright corals around the octopus so that they were less distracting and there was better contrast between the light octopus and the darker corals. The photo in plate 95 was inadvertently cut across the top of the octopus' head but I kept the pieces and the cut line was repaired in photo shop.

Even though I shoot with film, there is no reason why I cannot take advantage of all of the manipulative capabilities of photo shop. Scanning slides is quite simple, especially if you have your own scanner. Get a copy of Jack and Sue Drafahl's book on digital underwater photography for more information about scanning.

Plate 97, My First Hermit Photo

When working with a hermit crab, you can turn it over and wait for it to come out for the photo. Don't place it completely on its back, as they are often too scared to come out. The opening should be vertical, but not upside down. Place it so that when they come out, the claws will make contact with the bottom fairly quickly.

Don't put them on fragile areas, or stuff them into sponges. Set them on the textured side of a sponge, or on some smooth algae. Put it back EXACTLY where you found it.

With the first extension tubes in the late 1960s, we had to adjust the length of the framer ourselves to be certain of the focused distance. It was also difficult to predict the center of the picture area. With this early 1:1 tube, I obviously placed the hermit a little too low and to the right. Later framers were fixed and were not to be adjusted. And of course, now we have SLR and digital to make certain that our subjects are properly framed.

Plate 98, Our Cousins

I enjoy looking for fabulous color combinations. If these yellow tunicates had been growing near a complex crinoid or something just dark or dead, it would not have made a great photo. Look for subjects that are not only interesting in themselves, but that are in a good setting. Not all pictures have to be difficult to take—you just have to be able to find it.

I used standard lighting, as the scene did not need more shadows and texture. I already had enough detail in the yellow lines and the red and white gorgonian. I shot from an angle that allowed the red to completely surround the tunicates.

Plate 99, Nautilus

I rarely do night dives, but when there is something exciting like a nautilus to be found, my energy is boundless.

When using an SLR or any digital camera, you need an aiming light so the camera can see well enough to focus. I used a flashlight attached to a shoe mount on my housing port. Sometimes I attach an additional flashlight to my strobe. There are fancy straps to help you do this or you can use stout rubber bands.

You should use small flashlights—not lights that are so bright that you light up the entire dive site and scare everything away. When shooting shy creatures, you may need to quickly cover the light with your hand before your creature pulls in.

Plate 100, Long Nose Butterfly Fish

Fish photography is best done with a telephoto SLR or digital camera. (See lesson for plate 73.)

Side lighting a fish that is not otherwise tame or friendly is very difficult. This photo was helped by a bit of luck as the fish was darting past me. But there are two important lessons here. First, if you keep your strobes bunched up near your camera, you will never get textures. You need to keep your strobes well forward of the lens to side light your subject. You also need to keep the strobes out of the view of the lens, so you need a relatively long strobe arm.

Secondly, having a great helper in the water can make taking fish photos much easier. When I work with students, I see which fish they are interested in and swim to the far side of it. The fish becomes wary of me and may slow its escape or even head back toward the photographer. If it is the type of fish that likes to hide, such as a rock beauty in the Caribbean, I can encourage it to stay in the opening facing the photographer in order to avoid me on the other side of the coral head.

Plate 101, Yellow Crinoid

Color counts—this same shape of crinoid can exist as black, dark maroon or green, but dark colors do not draw attention; dark colors receive yawns, and often fail to create interest. The viewer is drawn to bright, colorful, sharp, contrasty parts of the image, so that is what you often need to provide. A fully bright yellow crinoid has lots of color but there is little contrast on an all-yellow crinoid. On this crinoid, the dark edges along each arm set up the contrast of the bright yellow to provide strong lines for the classical triangular composition.

Two-strobe lighting highlights both sides of the crinoid. To get the blue background, I opened the aperture and moved the strobes back to the appropriate distance for the f/stop used.

Plate 102, Frog Fish

This demonstrates one of my favorite lighting techniques. The first strobe is a standard strobe at 45-degrees from the right. The second strobe is above and a little behind to rim light the top edges of the fish and the sponge. Rim lighting gives wonderful dimension and a feeling of roundness to virtually any subject. Watch TV and movies, even something simple like the evening news and look for the rim light on the newscaster. This light is also called a hair light, highlight, etc. I certainly did not invent it, but I surely do like to use it a lot.

The eye contact and the down-turned mouth on a bright yellow fish made this an instant subject. The lighting made it better. When photographing a subject that you have not seen before, start with your strobe more from the front to make sure that you have a good documentary image. Then move your strobe further toward the plane of focus until it is a little behind the subject. Keep the strobe at the proper distance; if it was eight inches away for the proper exposure from the front, then make sure it is still around eight inches when you hold it from the side. It is easy to accidentally move it in too close as you move the strobe forward.

By getting down to the level of the frogfish and shooting him at his eye level, I gave him a high stature in the photo. I started by shooting him from the other side, at a 45-degree angle so the entire fish could be seen. Then I shot a vertical of just the front, face on. Moving to the side where he was partially hidden gave him an entirely new aspect—one of him hiding or lurking. It accentuated the feeling of the face only and gave less of a simple depiction of a fish.

Plate 103, Closed Crinoid

Lighting for drama: In plate 101 I pretty much said not to bother shooting brown crinoids. I made it clear that the viewer's attention is drawn to bright, colorful, contrasty, sharp areas of the subject. When put to a vote, most people who could choose only one of these two, would choose the yellow one. However, we do not always have to shoot for the majority. Variety has a value of its own. So do other attributes. For instance, if a photo does not have color, it can still have contrast and sharpness. After all, my black and white images have no color.

I loved the shape of this crinoid, but since it had no color, I did not just give it the same two-strobe even lighting as I did for plate 101; I had to create contrast to enhance the pattern. I chose to put both strobes on the left; one strobe is coming from the lower left and the second strobe is coming from...yup...above and a little behind, just like plates 36, 37, 46 and 102, 105 and more. The result produces strong, contrasty lines in a classic oval composition.

Plate 104, Red Carpet

I was entranced with the graceful lines of this lionfish—usually their fins are erect and displayed at all angles. I also liked the bright red background. This is an example of a “found” photo opportunity. Always be on the lookout for unusual behaviors and poses!

Plate 105, Pygmy Seahorse

The area of this photo is about an inch across, so first you have to find the seahorse and then keep your eyes on it. If you are using an SLR it is difficult to find the fish while looking through the lens because the fan looks the same wherever you aim; if you missed the seahorse, it is almost impossible to tell which way to move the camera to find it. Have a guide use a toothpick to aim at the seahorse. You can easily find the guide's fingers and toothpick and follow it to the seahorse. Once you have it, he can remove the toothpick and you can shoot.

Some people like to fill the frame with the tiny seahorse and use a system that shoots at about a 2:1. This can be with a 2:1 extension tube, or with close-up diopters on a telephoto lens. If you use diopters on a wider 60mm lens you have to work too closely for convenience, so using a 105mm lens is usually better.

If a tiny seahorse fills the frame, you lose the perspective that he is tiny. I like to let the seahorse look small, so I shoot with a straight 1:1 system.

Seahorses tend to turn away from you, so it helps to have a friend or guide remain on the far side of the fan. This will keep him facing in a more central direction. Don't poke at seahorses or try to move them as they may start to move around and expose themselves to predators.

To shoot this fellow, I wanted to rim light him to help separate him from the fan. I shot from the side of the fan with one strobe on the right side of the fan and the left strobe from above and weaker. The right hand strobe encouraged him to stay on my side of the fan. By shooting along the length of the fan, the distant background fan is much more out of focus than it would be if I had shot the fan straight on. This also helped to make the tiny seahorse stand out more.

Plate 106, Seahorse Face

Lighting with two strobes: This large seahorse was much easier to work with than the pygmy in plate 105.

Notice where the light from the strobes is falling. As I often do, I moved the left strobe far to the side to rim light the face and neck, while the second strobe on the right is weaker and allowed soft shadows on the front of his face. The eye is fully lit and there are shadows on the face to enhance the three dimensionality.

Shooting from a slight angle allows more of the face to be within the depth of field, giving a view of the mouth and forehead. The angle also provides a feeling of depth. Because there is not a lot of detail, crisp sharpness is not critical and there can be a slight loss of focus without it being a distraction. The down-turned mouth adds an emotional aspect.

It is easy to shoot seahorses because they generally do not swim fast or very far, but it is also easy to abuse them. Be sensitive to these shy creatures, especially when using extension tubes or framers. They want to turn away, and it is a temptation to hold them against the framer for the photo. You should not, however, let the temptation win. Shoot them as they turn, or have someone on the other side distract them so that they look back toward you. If possible, it is better to shoot with camera systems that do not need framers.

Plate 107, Ornate Ghost Pipefish

Unlike the seahorse, these pipefish have intricate detail that demands that it all be sharply focused. Shooting them at an angle results in disappointment at not seeing the details sharply.

Plate 108, Ornate Couple

Changing angle to control background: It is not easy to make a dramatic photo when shooting these ghost pipefish hidden in their crinoid; I wanted them separated from their crinoid so that they would be more visible. Thus, I changed angles until I was able to shoot them against a plain background. By using a small aperture and a close strobe, the background showed up as black.

Don't expose hidden creatures to predators: Be careful when working with any subject that depends on its camouflage. One of my most horrifying experiences underwater occurred when I was working with a harlequin ghost pipefish in the Solomon Islands. It was dusk and I had my flashlight on the fish. He moved away from his hiding place to avoid my light. Unbeknownst to me there was a predatory grouper hidden above in a crevice. He swooped down and engulfed the pipefish in a flash so fast that I wasn't even sure that it had happened.

I admit to this terrible event hoping that it will help you to avoid my same mistake. Be aware of interested creatures nearby that may be waiting for you to disrupt a creature. I realize that the grouper had a right to eat its own natural prey, but I should not have been the instrument of disrupting perfectly good camouflage. It will not happen to me again, and when working with my students underwater, they sometimes wonder why I quit helping them with a creature that starts to leave its hiding place. I know that if he exposes himself he may not survive. So even though it may improve the photo opportunity, it is not worth the risk.

Plate 109, Perfect Polyps

Cropping for composition: There are many ways that you can shoot lovely subjects such as this. The first decision involves the degree of magnification desired. Do you want the whole set of fronds, a piece of one frond, or perhaps just one polyp? With digital or SLR you can start from further away and just keep shooting as you get closer.

I chose to put the composition at an angle to provide a feeling of action. The strobes were simple right and left as I felt that the polyps themselves were so complex that it didn't need any more confusion with side or backlighting. I wanted the red core and the white polyps to all be equally lit. I found one frond that was out to the side with no others behind it so that the background would present no distractions. By using a small aperture for the close strobes, there was no exposure for the sunlight.

Plate 110, Polyp Fists

Watch the creatures underwater that are all around you on every dive—they can amaze you. I love this photo, yet this subject looks like nothing when you swim past it. When I started with this gorgonian the polyps were fully extended, giving it a bushy appearance. Watch what the polyps do as you work near it. Sometimes the flashlight makes them pull in, or accidentally touching it with an extension tube will make them pull in. Eventually they will pull in so far that they completely disappear. If you gently touch a polyp, all of the polyps will start to pull in. Look at the changes in their appearance and see if you like the photo possibilities.

I followed several of the tips that I have mentioned earlier: (1) I found a section of this gorgonian that had no distractions in the background. (2) I included enough of the gorgonian so that I had a sense of size of the tiny fists. (3) By using a strobe in close and a small aperture, the background became black. With some digital cameras only going to an f8, you can make the background dark by using as fast a shutter speed as possible. Many digital cameras (but not all) allow you to use 1/500th of a second or even faster. (4) I held the main strobe a little closer and slightly from the side so that a shadow on the right created a feeling of roundness.

Plate 111, Ruffled Nudibranch

Study the photo and find where the strobes are being held. Where are the shadows? Look at the brightness around the ruffles and the gills, while shadows fall around the body. By holding the strobes almost level with the nudibranch, the brighter ruffles are well separated from the body, producing a strong feeling of three-dimensionality.

The strobes were at a big enough angle to the sides so that they did not light the background behind the gills.

Plate 112, Leather Coral

Lighting from above and behind: Sometimes you may spend your dive swimming around without seeing anything exciting—there are no turtles swimming by, no sharks sneaking up behind you, no amazing crabs hiding in a crevice. There is nothing anywhere with eyes. Most people looking at your underwater photos want to see eyes and action. But while those photos are more likely to win contests, as they are fun to look at, there are many other subjects that are beautiful and can take their place on a wall year after year without getting tiresome.

This leather coral is a simple subject that with normal lighting would have little interest. But by holding my strobe in one of my favorite positions—above and a little behind—the changes in lighting create their own interest. The top is rim lit, parts are actually backlit, and notice the sections that are side lit.

Plate 113, Cuttlefish

An advantage of an ultra wide lens (such as the 12mm Nikonos, 13mm Nikonos RS, 16mm Nikon full frame fisheye for film or the Nikon 10mm DX lens or any other lens that allows a full 180 degree picture angle to the corners) is that you can change the way things appear from the normal point of view. It allows you to get close to very large subjects. However, when you have a small or medium sized subject, you must get very close.

This cuttlefish was less than ten inches long but he allowed me to get up to my minimum focus distance of about six inches. I metered for the blue, and held the strobe at the distance that matched that setting.

I laid on my back under the cuttlefish. I had to hold my breath, but since I was on the rubble bottom, I could make sure that I was not rising toward my subject. I would have liked to have positioned him more against the sun, but as you can see in the photo here, I was up against a wall of coral and could not get a better angle on him. I was forced to let the sun remain in the upper corner. Fortunately, there was enough coral in the lower right to balance the bright sun.

Plate 114, Laying an Egg

Reducing background distractions: We were in extremely shallow water—about ten feet deep—as we watched this female court with the male and then deposit egg sacks into the coral recesses. Since she was moving deliberately, all I had to do was move slowly and quietly without scaring her off. I set one strobe far to the left to highlight the eye on the left and the egg mass, and I placed the second strobe high from the upper right to delineate her back and leave shadows under her. I did not want all of the coral evenly lit.

The background here was very distracting, so by using the fastest shutter speed that would synch with the strobe (in this case $1/250^{\text{th}}$ second) and a small aperture for the close strobes, I could darken the background and thereby reduce the distractions. In this way, more attention was brought to the egg mass. If I had wanted to manipulate this photo digitally, or even in the darkroom, I would have darkened the coral on the upper left side just a little to draw your eye more toward the egg.

Plate 115, The Attack of the Cuttlefish

Working with models: I was lucky to have a quick dive buddy who understood my hand signals.

I was able to get my head and camera under him so that the sun was right behind him.

I directed Herb with clear signals so that he could be in the right place. He already knew that he needed to be able to see the aperture of my lens in order for the lens to see his face. He knew that he should not let the cuttlefish hide my lens.

I directed him with one dimension at a time. I didn't point to the end position, as a model cannot really see that position. In other words, if I had wanted him to the right, further down, and further away, I could not just point to the spot where he ended up. I would have to **indicate one dimension at a time**: go further to the right, go further away, go lower in the scene.

I metered, as usual, for the average blue. With a wide lens it is difficult to shoot extreme upwards like this with contrasty film. If I had used Velvia, for example, the bright sun would have been even brighter, and the dark area around Herb would have been too dark or even black. With a film with less contrast, such as Kodak Ektachrome 100S, I had enough film latitude to handle the extreme contrast range.

With a digital camera, set the contrast for the lowest setting. (As I write this in 2005, most digital cameras have a small contrast adjustment. I am sure that in the future, you may not need the lowest possible setting.) Also with digital cameras, don't forget that a proper blue reading is often indicated by a meter reading of -0.7, not 0.0.

The wide-angle perspective makes near subjects appear much larger than they are, and far away subjects much smaller by comparison. Bring your left hand close to your face and hold your other hand far away. Does the close hand look larger? Is it really larger? Or did you not get a matched set from your folks? If you didn't, then use two other objects for this illustration.

Plate 116, Golden Soft Corals

I did not have a lot of time to work this photo so I simply followed the classic rules. Try to find a shape, isolate it from the background, and light it from the sides.

I liked the **simple "S" shape: it creates a feeling of movement.** Compare it to the one on the next page that is standing straight up. The one on the right gives you a feeling of a stop sign: it is abrupt and stationary. The one on the left appears to be swaying, but is actually stationary also.

I held the large housing on its side and that automatically moved the strobe to a position above the coral to accent the light from above and leave shadows on the underside. The second strobe is coming from the right—not from below. I use flexible UltraLight arms so that I can quickly adjust the strobe angle.

Plate 117, Small Soft Coral

The dive had relatively few things that excited me, but I saw this tiny soft coral growing under a coral overhang. I found a place to set my right knee and my left fin so that I was stationary without hurting anything.

The soft coral was not far from the background. If my strobe light had hit the wall behind the coral, the photo would have been ruined. I needed to aim the strobes so that they would not hit the background. I could not hold them from the sides, as the area was blocked by the coral around it. I liked the orange sponge and decided to hold the strobes below the sponges and let the sponge block the strobe light.

I got close and aimed the camera vertically, focusing carefully on the coral. At the moment of shooting an SLR camera, the shutter blocks the viewfinder and you can't see the effect of the strobes. I needed to see if the strobes hit the coral and missed the background. I held the camera steady and sacrificed a photo by looking around the side of the camera as I took a picture. I saw the strobe light do what I wanted it to do so I took one more photo looking through the viewfinder to make sure that my aim was just right.

I knew that I would have shadows, but the shadow creating the illusion that the coral was floating above the sponge was just luck. It was not luck, however, that I moved the strobes around and encouraged these shadows.

Plate 118 Black-foot Anemone Fish

I was drawn to the harsh color conflict of the brilliant orange and the bright pink. The black and white markings on the fish set it all off. The problem was twofold: the current was terribly strong, as witnessed by the anemone being blown away, and the fish preferred to be on the lee side of his anemone and away from me.

The coral in the Maldives had undergone a terrible bleaching and much of it was dead and consequently covered by these fabulous anemones. Thus, I had no difficulty choosing a safe place to put my left knee. I also had a reef hook (see plate 121) holding my upper body so that I did not have to touch anything near the anemone. I reached around to the down current side with my free right fin to encourage the fish to swim to the side where I was shooting. He would dart around, look at me and then swim back to the other side. I would wiggle my fin and he would come back for another photo.

I kept the strobes well to the sides to keep the strong shadow in the center of the anemone behind the fish.

Plate 119, Jellyfish Rider

There is not much to this photo—I just liked the dimensionality of the fish and the tentacles, although it seemed to look much better as a slide. When you look at a transparency, the gradient of transmitted light is much greater than can be achieved with the reflected light from a print or page. Scanning the slide and then printing it with dots of ink further degrades the image. Look at this printed page with a 4x loupe or strong magnifying glass and look at the dot pattern. It is amazing that it looks as good as it does.

Compared to the subtleties of the original slide, the image pales in comparison. It is the job of the publisher, in this case me, to choose those sorts of photos that will survive the printing process and I am not sure that this one did.

In planning this book, I started with several hundred photos and then took out the least favorites until I had only about forty more photos than I could use. Then I asked several different types of audience what they liked. I asked my staff and Herb, of course, I asked a few students, like Walt Plaessmann and his wife Lynn Peters, I asked my bothers Denny and Steve Hoffman and their families, and I asked an artist friend, Christine Smith. From all of these people—divers and non-divers, nurse, engineer and financial analyst, I tried to keep any slide that they said was their favorite, for whatever reason. I eliminated those slides that may have interested the biologist in me, but left everyone else saying "WHY?" I will put a few of those photos up here when I finally unpack my slide files from their waterproof pelican cases. That will happen when we finally get the mildew under control from the flooding here at the photo centre from hurricane Ivan.

Anyway—back to the photo: The jellyfish was mid-water, and I simply worked to maintain my position in the water without making drastic vertical changes. The hard part was focusing on the fast moving fish that always wanted to be on the far side of the jellyfish. The main strobe is from the side on the left lighting the fish's face, and the second strobe is mis-aimed from the right and lighting in front of the fish, missing the area of the jellyfish behind the fish. It was not on purpose, but the photo works.

Plate 120, Eight Anthias

I love the blue/purple circles around the eyes of these lovely goldfish. They dart about and are usually all at different distances, so if you focus carefully on one, the rest are usually too close or far for decent sharpness. With a wide-angle lens, you must work too close to the reef and the fish are scared away. If you back up, the fish become too tiny, unless the school is large and the reef is colorful.

In this area, the reef was average and the schools of Anthias were not dense. I could not fill the frame well enough with just one Anthias, and they were too random for a group photo, but I waited and worked with them.

There was a good current running so they were heading into it and staying as a group. I took one photo before they dispersed into the reef a few feet to the lower right. I quickly swam in that direction, used my hand to scoop them along, got in front and took one photo before they went down into the reef to reappear elsewhere. Next I used my fin to send them my way; I took one photo as they approached then went into the hole on the left and re-emerged way down to the lower right. Again my fin sent them back up, one more photo, they left, I shook my fin and so on and so on.

That I finally got the shot was of course dependent on luck that they assumed this formation at all, but it was not luck that I gave myself lots of opportunities.

Plate 121, Yellow Seahorse

Here we are with seahorses again—how can you not shoot a seahorse if you are lucky enough to see one? This one was large, about four inches high, and he stayed nicely in this incredible gorgonian. I was leading a photo tour, so my first job was to make sure that everyone who was set up for this type of photo had an opportunity to take some photos.

I stayed on the far side of the seahorse (but not in the photo background) and encouraged it not to leave. I advised the photographers to use a vertical camera position and to bring the light into the seahorse's face, rather than the backside. Once everyone had several photos, I took some myself, let others come back for seconds, and when everyone was done, I had plenty of time to continue shooting.

I moved my left strobe as usual to the far left at first, but the gorgonians in the way left heavy shadows on his face and body. I took more photos bringing the strobe closer and closer to the lens. There was still a small shadow on his nose, but the front lighting was already starting to lose texture on his body. By keeping the right strobe to a minimum, I was still able to highlight the seahorse amid the deep red.

Plate 122, Lizard Fish

I don't often use the really long lenses, but when I am in the mood, they allow a great change of pace. Anytime you think that you have dived in the same area too often, or you are getting blasé about a dive, change lenses. Do something drastic. If you generally use a wide lens on that dive, switch to telephoto or close-up. If you have done a lot of close, try even closer. There are several systems that specialists have developed for taking photos of subjects less than half an inch across. Use teleconverters and close-up diopters to get in really tight.

In this case I used a 2x teleconverter (see Plate 90). The fish was facing from left to right and I was lying on a rubble bottom. I took my left strobe and moved it far back from overhead. I took the right strobe and moved it way forward and level with the fish's face. I braced the large camera with my elbows on the bottom. As I focused on his eye and teeth I looked at the strobe to make sure that it was aimed at his mouth.

I took a photo and then moved a little closer. I shot, moved closer, backed up to adjust the strobe, and moved closer and continued until I had only the teeth in the frame and then he swam off.

Plate 123, Green umbrella

There was a lot of sand on this rubble or "muck" dive, but there were also a lot of this tiny green algae. It is shot not quite straight on. Look at the depth of field. Do you see that the focus is across the middle with the front and back ribs slightly out of the depth of field? It gives it dimensionality and a dynamic aspect.

It is side lit, as usual, to highlight the "ribs" of the parasol. I held the strobes quite low to the sand and aimed them upward slightly to reduce the light hitting the sand which was darker than normal anyway. I wanted the parasol to stand out away from the sand leaving it a mystery as to what is under it, holding it up.

I placed this photo with the lizardfish because I liked the green circle in each photo.

Plate 124, Hawkfish

This hawkfish was shot with the 105mm micro Nikkor telephoto and 2x teleconverter (see Plate 90). I set the strobes at normal lighting with both strobe at about a 90-degree angle above the subject and then had to suddenly turn the camera vertically. With a housed camera without a flip tray, you must then re-position your strobes. I didn't have time, so the strobes are coming from the lower left and the top.

He was in focus in this position for a split second, so this was not a case where I could shoot, change strobe angles, and shoot some more.

The narrow depth of field with the telephoto lenses really helps to throw the background way out of focus. The sponge and the dark wreckage of the Ann create a soft, lovely pattern.

When I look for subjects, even when shooting fish with a telephoto, I am drawn not just to the beauty of the fish, but also to the setting. These fish usually hang out in gorgonians, but this one was playing all around the convoluted folds of the pink elephant ear sponge.

I will put up a long shot of this area next month.

Plate 125, Pipefish

This was taken on the same trip as the hawkfish and lizardfish. It was my "fish phase". Each trip has a sort of theme with me. Sometimes I end up shooting every tunicate I can find, or I will shoot roll after roll of black and white sea fans. This trip was entirely shot with the telephoto.

The problem with pipefish is that they are so long and thin that they don't fill a frame of film very well so I stalked this one until I had just the face.

I could have cropped it more, I suppose, until the eye became more dominant. However, I also liked the scene showing more of him as he swam along the terrain. Which way do you like it? Crop it more and more until you have cropped too far—maybe until you have just the eye. Now back your cropping tools (pieces of paper or whatever you are using) until you end up where you started. Choose your own favorite place. Do this frequently with all of your photos. Crop just to look at them, then back to the original and then choose. Get rid of anything that does not HELP the photo. Don't just eliminate all empty space—you often need an empty area to create a sense of place.

Plate 126, Nudibranch on a stick

There are two lessons here involving the background. I had originally photographed this nudibranch from the front. From that angle, there was nothing behind him so the background appeared black. However, I rarely shoot from just one angle, but rather I like to explore the scene and look through my camera from different angles. The patterns of the sponges on the rock behind the side view were lovely.

The second portion of the lesson is to experiment with depth of field. At my usual small aperture of f22, the sponges appear rather distinct, so I experimented with opening the lens by several f-stops. I then chose the photo that allowed the best combination of depth of field on the nudibranch and soft out-of-focus patterns in the background.

Plate 127, Yellow Anemone with Tenant

When shooting film, I frequently depend on the TTL mode to help refine my exposures. I set the aperture for the closest f-stop that I think is right for my strobe to subject distance. If I am too close, the TTL reduces the exposure for me. This is especially handy with an SLR camera as a moving subject may cause my distance to change rapidly without my having a chance to change the exposure.

TTL, however, can cause a problem if you want the image to remain lighter than an average gray that the camera is programmed to produce. To keep this pale yellow anemone and the white crab bright, I adjusted the exposure compensation dial to +1.5. With a digital system, without TTL, you would have the reverse problem; you would likely have too much strobe and would need to set it for a much lower power. Since some digital cameras do not go to a smaller aperture than f8, you would need to use a very low power setting, a diffuser, and/or hold it further back.

With both color slide film and a digital camera, you do not want it to over-expose. You want the yellow to remain saturated but not so bright that the tiny details disappear. With color negative film, too much light is not as big a problem—it actually may make it easier to make a good print.

Plate 128, Blue Christmas Tree

This photo puts several lessons together.

1. To keep the white looking white, when using TTL, set your ISO for a lower ISO or set your exposure compensation dial to +1 to 2. (See plate 127.)
2. Look at where you want your highlights and shadows. Where did I hold the primary strobe? Above and a little behind. Can you see the highlights on the insides of the spirals? By coming from above and slightly behind, this light also created shadow texture in the background.
3. I set my SLR (Nikonos RS) for manual focus, and then adjusted it for the closest focus possible (around 1:1). I braced myself against small dead or bare areas. Looking through the viewfinder, I approached the subject until the focus was at the center of the spirals and took the photo.
4. I saw that this was a stunning opportunity and finished my roll of film on it. (I had only about eight photos left.) I shot, adjusted by exposure compensation for more light, shot again, added more light and shot again. I am glad that I kept adding light, as the brightest photos were the best.

Plate 129, Cathy's Corals

This is my favorite soft coral photo so far. I like the mix of pastel colors and the detail in the shadows. I used a relatively low contrast ISO 100 color slide film at a time when highly saturated photos taken with films like Fujichrome Velvia were more popular. Now with photo shop, everyone is still increasing saturation and color. Even the printing of this photo in my book is more saturated than the original prints in my gallery.

I got all of this incredible color by getting really close using an ultra-wide 13mm lens with an angle of view of 180 degrees diagonally. (This would be equivalent to the current Nikon digital SLR cameras with a 10.5 mm lens.)

In Fiji, the soft corals open generally only in a strong current. You can see that the fish are lined up against the current and a reddish sea whip is leaning in the current from the right.

It takes extra **precautions to photograph in a strong current** without hurting the reef. To slow myself down, I don't kick at all, or swim very gently against the current, rather than swim with the current and make my travels even faster. I lie sideways in the water, feet down current, watching the scenes ahead of me as the current carries me along. When I need to stop, I set a large blunted fishhook on a line into a rock to hold me in place as I plan my next move. Since I am already oriented with the current, my body and camera do not jerk around as I am stopped by my reef hook that is attached on the up-current side of my BC. The trick is to find just the right spot strong enough to hold me without hurting anything fragile nearby.

I study the scene around and beyond me and look for another place to hook in as I work along the area that interests me. Sometimes I have to do some strong kicking while I am getting hooked in, but the cord then lets me relax. This coral head was at the bottom of the channel so I could work easily on the rocky bottom. There are many areas that are beautiful that I can't even consider shooting if I can neither kick against the current nor hook in.

Plate 130, Fumitsuki Bow

I used my usual ultra-wide 13mm lens (equivalent to the Nikon 10.5 mm digital lens) to allow me to get close to the bow of this ship. The small ship provides a much better photo than the large ships in Truk Lagoon, as you can get closer and therefore enjoy better contrast. In color, the photo would look like this—a mix of blue on blue.

By increasing the contrast, and making the background white in the darkroom, I enjoyed the more dramatic appearance of the bow in black and white. I lightly bleached the white corals and sponges on the anchor line to enhance the highlights.

The photo was taken on Kodak T-Max 400 film, and printed on Ilford Multigrade IV fiber paper.

Plate 131, Truk Truck

The truck is relatively deep so I had only a brief look at it when I saw it on my first dive on this wreck. On a trip a few years later, in 1997, I dove on the wreck again and photographed the truck on Kodak T-max 1600 film rated at 3200. I used high-speed film to provide some exposure on the dim sunlight coming through a hole in the deck above in the background.

Unfortunately, my strobes, even on their lower setting, were too strong for the wide aperture and high-speed film and way over-exposed the right and left sides.

The negative is so poorly done it takes me almost a half-hour of exposures to burn in the sides while not making the truck too dark.

I went back another year to shoot it over again, but got turned around at depth and could not find the truck. Since most of the group did not care to dive this site more than once, I did not demand that we all go back a second time. A year later I tried again. This time I looked for another truck that had its hood intact. However, someone had taken the beautiful front light and set it on top of the hood. By the time I managed to gently put the headlamp back on the fender where it belonged, my time was low and even with the utmost care there were too many particles floating around the hood. I would try again on my next trip. I do not know when that next trip will be. So I just keep working with this negative, as I still love the resulting print—I just wish it were a little easier to make. Perhaps I will try printing it digitally.

I will put up here two more Truk truck photos—one of the straight negative without adjustments and one made digitally. Sign up for my email list and I will let you know when they are done. (I send out only a few per year, I do not share the list and I have no idea how many months it will be before I get them done.)

Plate 132, Solomon Sea Fan

I have photographed hundreds of sea fans. I keep at it until I find just the right one and I think this is it. I loved the flow of the line from the base in the lower right, around in an arc to the fish on the upper right. I moved until the sun was in the center of the arc and got low to include the foreground.

I like using the ultra wide because I can include the foreground only a few inches away to provide a feeling of depth. I like to provide a place for the viewer to be in the photo. The foreground gives a sense of place and a bottom to stand on as one enters the photo. I can't always do this, such as with photos like the barracuda, jellyfish and algae in plates 141, 142 and 143, or the three-manta sequence, but most of the others provide a foreground.

To print this I made a series of complete prints at exposures ranging from ten seconds to sixty seconds. I then cut out the shape of the best exposures and assembled them to make a print. I noted how much time each area needed and drew it onto an extra print. The increases in time formed concentric rings around the sun with a linear transition from the bottom to the middle of the print.

With practice I was able to move my hands to shield the dim bottom while adding more light for the bright upper and center areas. I altered contrast a few times, and adjusted the cropping to emphasize the curl in the fan. I wish the book showed the richer blacks that are in the print, but your entire book costs only \$40.00 and the custom print costs \$300.00

The photo was taken on Ilford Delta 400 film and printed on Forte Polygrade V fiber paper. I used Ilford Delta for its ability to maintain details in the highlight areas. I exposed for the deep shadows and reduced my agitation and time during development to control the excessive highlights.

Plate 133, Jacks with Diver

The lesson here is to just keep shooting. I have been to this dive site many times, and have shot dozens of rolls of film. The dive site is the same, but the events are an ever-changing kaleidoscope. (I know that is an over-used expression but it is a good one.) The events are never the same and you have to be both lucky and ready. You have to recognize a good scene when it is presented to you and shoot quickly as it changes. You have to always be ready to move so that you are in the right place.

I used a wide-angle lens and exposed for the mid-water gray. This print is a little darker in the lower left corner than my gallery prints. I had to darken the bright sun that is on the middle right side. The event did not allow me to include the sun closer to the diver or the boat, so I had to print it dark enough that it would not pull the eye too much to the right. There are a lot of natural light and dark areas in the partly cloudy sky so it was difficult to keep a natural look while adjusting the exposure.

I shot the photo on Kodak tri X400 film and it is printed on Zone VI Brilliant VC fiber paper. I used Tri-X because contrast and exposures varied so quickly with the jacks that I could not pre-plan my exposure and development procedures to adjust contrast. Tri-X is a great film for shooting quickly. It does not vary as much during processing as T-Max, so you get a usable exposure in almost any conditions. This is a double edge sword: on the one hand it does not vary much but if you want to change the contrast range of the exposure by manipulating the processing it does not change as much beyond the average.

Plate 134, Manta Cleaning Station

The lesson here is simple: be willing to sacrifice a guaranteed mediocre photo opportunity for the possibility of a stunning opportunity. We were told that a very large manta frequents this cleaning station, but that it may not happen during our dive. Most of the group waited a while and then swam off to the reef. I stayed at the area studying the possibilities. I wanted a foreground that would include something that would be interesting in a black and white silhouette. I liked the crinoid and got low enough that it would be separated against the clear background. I took some meter readings and got set, hoping for a manta. Almost the entire hour went by before a huge manta swam into the scene against the sun and in a prime position with the crinoid. It was perfect. I got three photos.

As the group came back they paused and we all headed for the boat. We were almost aboard when another large manta swam into the scene and we all went back down to shoot more. But the shot from my first set was the best. I was low and shooting up. My camera was ready, and the print is relatively easy to make.

The photo was taken on Kodak Tri-X film and printed on Forte Polygrade V paper.

Plate 135, Manta

I was set up with a 28mm lens in preparation for photographing sharks at a shark feeding in Chuuk. However, we all somehow missed the feeding—the guide had left us well behind because he could figure out which way to go. The swim was long, the food got lost, and no sharks showed—it was a fiasco. But no dive is really a failure if you are underwater and have a functioning camera, so I started swimming and looking. I was lucky—I found a manta enjoying the thick plankton and it even did a few loops around me.

While I would not ordinarily use a 28mm lens on a large manta, the combination allowed me an extraordinary opportunity to shoot just the eye, palps and underside. I did not have much opportunity to take meter readings and plan my development and contrast ranges,

The photos were taken on Ilford FP4 Plus film and the first series was printed on Kodak Polymax paper and subsequent printings were done on Forte Elegance Polygrade fiber paper.

Plate 138, Silver Tarpon

This was one of my first black and white images. I have spent many hours among the minnows of Devil's Grotto in Grand Cayman. The challenge is to maintain depth and shape among a mass of minnows. If you aim into the dark grotto and simply light the front side of the school with the strobe, the result is a flat photo of bright minnows with a black background.

I wanted the photo to show more depth so I went into the grotto and turned around to see out toward the sun. In this cave there was a small opening overhead, and a tunnel with a few side slights and light at the end. I was in a solid mass of minnows that would not photograph well. The tarpon provided a point of interest, breaking up the school to create a pattern and supplying the story line of predator and prey. I had to wait for them to make the right moves. Without them, this scene did not have enough shape.

I knelt quietly so I would not scare them away too soon. The school of minnows opened up to keep their distance from the tarpon swimming through. With natural light, the tarpon and minnows would be black silhouettes or invisible against the black parts of the background. I rarely use strobe in my black and white photos, but I do need it when shooting interiors such as these minnows and the Truck in plate 131.

Since the strobes lit the edges more brightly than the center I had to print the edges darker. I also had to darken the shine on the tarpon, and lighten the exposure on the second tarpon and the jacks coming along behind.

The photo was taken on Kodak T-Max 400 film and printed on Kodak Polymax fiber paper. I used the T-max so that I could control the extreme contrast range from the dim background to the bright tarpon. By exposing the film for the deep shadows inside the grotto (which is why I needed the 400 speed), and by manipulating the development, I could control the highlights enough to make the printing job easier.

Except perhaps for the Fuji S3, you cannot shoot this range of exposure on a digital camera, but you can scan the negative and manipulate it and print it digitally. That way you may enjoy the best of both worlds—better contrast control and ease of printing. I am just now doing that with this image.

Plate 139, Starry Night

I have always wanted to create an image of a coral reef that just made one want to relax. Unfortunately most of my images made people really relax—I mean yawn. Most reef scenes can be a bit boring. People like to see activity. They like subjects with eyes and they like color. So here is one of my favorite photos. It doesn't sell well—it has no action, eyes or color. But as Jimmy Buffet sings, "I won't make my ~~music~~ {photos} for money, I'm gonna make my ~~music~~ {photos} for me." And this is one of those that I did for me.

As with many of my black and whites, I wanted a strong foreground that would lead the viewer into the background. The background needed a point of interest and the upper area should have something to offer as well. After years of exploring the Solomon Islands reefs I found what I was looking for.

By darkening the lower foreground I could emphasize the corals that make up the "stepping stones" to the large coral head brightly lit in the shallows. The dark wall of the island separated the coral head to give the photo an ending point. The white clouds and dark shadow in the sky are perfectly separated from the dark wall by the light area that reflects the shallowest corals against the surface.

The photo was taken on Ilford FP4 Plus film that provided enough contrast to produce both black and whites. I took meter readings with a spot meter to evaluate the contrast range and set my exposure slightly into the shadows. (I exposed for around a 3 on the zone system of 9.)

I printed the lower half at a contrast of around 2 on Forte Polygrade V fiber paper. I adjusted the contrast to a higher setting when I burned in the clouds.

Plate 140, Stairway to the Star

I was out of film when I swam into this narrow channel and I fell in love with this scene instantly; I had to rush back to the boat and change film before the light changed. I made it just in time, as a rain squall moved in as I was finishing.

I used a medium format camera to take the photo. But I had been having problems with the camera system and did not use it often. The large port is not coated and it creates a large flare in the lower right that was not corrected very well on this print. (I could not send my finished, mounted photos off to the printer to make the book, so I had to use seconds. I know that may not have been the best decision, but it was as good as I could manage at the time.

As with many of my photos, I wanted a place for the viewer to "stand" or "enter" the scene. I like to use the ultra-wide lens low and close to the bottom. Much of the coral in this area was dead from a recent coral bleaching so I had to work hard to find a way to make it look good. This piece of coral was not very big, but it looks big by getting so close. The hard part was the exposure—the range from the bright sun to the dark shadows exceeded eleven f-stops.

Even with processing adjustments, this negative needs to be printed with an unsharp mask. With this technique you can better control the highlights and improve the contrast in the rest of the photo. I have not done this yet with this print but I look forward to trying.

Shot on Kodak T-max 400 film and Printed on Forte Elegance fiber paper.

Plate 141, Barracuda

This is one of those exciting opportunities where the photo far exceeds the image presented. I rarely shoot just fish—they usually do not offer an artistic opportunity, but I was intrigued with the patterns presented by this school of barracuda. I used a high contrast film—Technical Pan—so that I could work with the extremes of contrast.

I lightened the exposure so that the tails look almost translucent rather than solid black, and made the background stark white to enhance the graphic design. I did not move or adjust any of the fish—they are exactly as they swam by me. Of course, I had a lot of images to choose from. I shot most of the roll of film on the schools of barracuda.

I expect that this photo could be done easily on digital—perhaps even better. I might just try that!

I will put up here two more barracuda photos—one of the straight negative without adjustments and one made digitally. Sign up for my email list and I will let you know when they are done. (I send out only a few per year, I do not share the list and I have no idea how many months it will be before I get them done.)

Plate 142, Jellyfish

I was coming up from a dive and had my ultra wide 13mm lens and a grainy Tri-X 400 film for deep wreck photos. This beautiful jellyfish was small in my wide lens and it needed to be cropped about 50%. The light beams were strong so I encouraged them in the printing.

I made the front tentacles dark and lightened the back ones to increase the feeling that the light was going right through the jellyfish. I left the bright sun white to increase the feeling of the brilliance of the sunlight. I have debated whether the entire background should be slightly lighter. That is the beauty of black and white. You can just keep playing with it; you can make different areas lighter or darker or any way that you like. There are more limits with color. You can't always just lighten it without it looking washed out or weak. With black and white, white is just another equal shade of gray.

Plate 142, Ocean Rose

I love these algae. They are all over the wrecks in Chuuk and they look like nothing when photographed normally. I darkened the edges and lightened the center to make it stand out. I use darkroom adjustments not just to fix a photo but also to create a whole new image.

I took a black and white printing class from John Sexton and one of the best lessons (among many) that I learned was as he was demonstrating how he printed a corn lily. First he corrected all of the areas that were a little too light or too dark. I thought "Wow, that's nice. I guess he is done now." That was when he said, "Now we are ready to start." Once he had the print "fixed" he was then ready to add and subtract impact the way he wanted the image to be seen.

I took his lesson to heart and did the same thing with ocean rose. In the original negative, the entire scene is almost all the same shade of gray. I added (burned) light into the corners, held light back from (dodged) the center and used a cardboard with a small hole in it to add small portions of light here and there among the "leaves".

The image was shot on Kodak T-max 400 film and printed on Forte Elegance VC fiber paper.

I will put up here two more Ocean Rose photos—one of the straight negative without adjustments and one made digitally. Sign up for my email list and I will let you know when they are done. (I send out only a few a year. I do not share the list and I have no idea how many months it will be before I get them done.)

Plate 144, Grotto with one fish

This is my signature print—the light beams of Devil's Grotto. The exposure range here was so extreme that I had to do a special processing. I made a developer that did not include the activator. In the dark, I dipped the film (that was rolled on a developing reel) in the developer. No development could actually start until I lifted the film out of the developer and lowered it gently into the activator. Then development started but the highlights quickly used up the layer of developer that was carried over to the activator. They stopped developing while the shadows continued to develop until they used up their developer. With testing, you can determine how many times you need to move the film back and forth. With the thinner, more modern films, this process is less effective as there is less developer being carried over to the activator.

With this type of development, it was relatively easy to make the print. I just needed to dodge back the right side slightly so that some detail of the rocks shows in the print, I held back the pathway that leads into the print, and burned in the bright area at the top, the bottom where the beam hits, the left side, and the shadow side of the rocks on the lower left.

Plate 145, Dolphins

I had just finished watching a shark feeding in the Bahamas and we were out of film and almost out of air when these lovely dolphins wanted to get close. I had never been close to dolphins before and really wanted the photo.

I jumped onto the boat, rewound my Nikonos V, grabbed a new roll, loaded it with wet hands and jumped back into the water. The opportunity to photograph these animals was worth the risk, to me, of ruining my camera. While I was extremely careful, I had no provision for fresh-water rinsing and drying my camera and hands. I took the risk, because I was ready to pay the penalty. My gamble was worth it. I was able to get off about six photos before they left. This is the best one.

I am not a dolphin photographer. I do not have hundreds of rolls to choose from. This is it. I have two photos—this one and the one taken right after it that is in my collection.

The lesson?? Assess your risk and be willing to pay the consequences. Losing the use a camera in the middle of a trip is rarely worth the risk. Always rinse your camera in fresh water before opening it with dry, salt-free hands. If you are changing film on a boat, rinse your face and hair and dry as much as possible with a huge, fresh towel. If I am wearing a wetsuit, I pull it down off my arms before opening the camera. If I can't take the wetsuit off, I wrap paper towels under the cuffs to prevent water from running down my wrist and hands.

In an emergency, I direct someone else with dry hands to work on the camera under my direction. I was in the water here at Sunset House when I realized that I had entered the water with my new D2x in a Subal housing

Title Page, Dive Boat

The key to shooting good upward photos is to **use a wide lens and get close**. If you shoot from further away with a narrow lens, the silhouette will have less contrast, and as you get further away the deepest shadows will become a paler and paler blue rather than black. As always, **meter for the average blue area**. With a digital camera, set for a lower contrast to keep details in the highlights and shadows. Also, with many digital cameras, don't meter for a "0", meter for around a -0.7. While the "0" setting should indicate a proper exposure, digital cameras seem to under-estimate blue backgrounds and yield a weak gray instead of a deep blue. To get the deep blue, use the -0.7.

Foreword: Spotted Eagle rays

Shooting any pelagic subject is dependent on how close you can get. If you have only one chance to dive where you might see something like these spotted eagle rays, you would have better odds if you used a narrow lens so that the subject will appear larger in your frame. The subject will appear smaller and smaller as you use a wider lens. These would have been tiny dots if I were to have used an ultra wide 12 or 13mm lens with a 180-degree diagonal picture area.

If you know that you can get close, or if you are willing to risk the odds to get the very best photo, a wider lens used closer will get the best photo. Use a closed circuit re-breather to greatly improve your ability to work closer to pelagic subjects.

My page, Crocodile Eye

To increase the difference between the blurred surroundings and the sharp eye, I simply opened the aperture and moved the strobe further away to prevent over-exposure. You could also simply depend on the TTL, add a diffuser or turn the power down on your strobe.

With digital systems, and Adobe Photo Shop, use the plug-in Vari-focus from Andromeda to increase the blur that would be caused by a reduced depth-of-field. Put the focused point on the eye and everything around it becomes progressively blurrier.

Compare this photo taken at a smaller aperture, and strobe set for a higher power, and the one in the book taken at the wider aperture. The reduced depth of field, plus the slightly lower camera angle gives more emphasis to the eye and feeling that he is hiding.

(See bonus photos for a close-up of just the eye.)



Back cover, Kissing Clowns

Although this was taken with an SLR camera, I have found that the best anemone and clown fish photos have often been taken with a Nikonos camera with a close-up or extension tube system that uses a framer. These fish dart around rapidly and with a framer you can see them coming and thus can anticipate the photo better. Also, the fish tend to center themselves to keep away from the frame on all sides, so the photo is nicely composed. With my Nikonos RS SLR camera, I can use one eye in the finder and open my other eye to see around the finder and watch the fish as they come and go. With a bigger housing, it is usually impossible to see what is about to happen and your reaction time is more critical.

Using the finest film grain possible, or a large digital file size will better enable you to crop the photo to improve composition.

Glossary:

Aperture: The aperture is the opening that allows light into the camera for the exposure. The size of the aperture can be changed to allow more or less light in. The aperture size is defined by how many of them can fit side by side between the center of the lens and the film or CCD. The size is thus a function of the size of the camera and is called the f-stop. The diameter of an f8 can fit between the center of the lens and the film plane eight times. A smaller f22 can fit in twenty two times. The diameter is $1/22^{\text{nd}}$ the distance from the lens center to the film. Thus small numbers like 2.8 actually represent larger openings because the number is actually $1/2.8$. The fraction is left out for simplicity. Since the number represents the bottom of a fraction, large numbers refer to small openings. The number is inversely proportional to the size of the opening.

F-stop: The measurement of the size of an aperture. See Aperture.

Focal length: the distance in millimeters from the optical centre of the lens to the film plane. A normal lens sees the world with a perspective similar to the way our own eyes see it—an angle of view of about 45 degrees diagonally. This is a picture area similar to that of a 50mm lens (with 35mm film). The angle is relative to the diagonal size of the film or digital CCD. With 35mm film, the focal length of a 50mm lens is equal to the 50mm diagonal measurement of 35mm film. Lenses shorter than 35mm are considered wide and have a greater angle of view, lenses longer than 85mm are considered telephoto.

Grain: The light sensitive chemical on film that is activated during exposure to make the image. When the chemicals are randomly distributed on the film they gather in erratic designs with empty areas showing through. These areas without color are what we call grain.

Shutter speed: the amount of time that the shutter is open for an exposure. It is generally a fraction of a second such as $1/250^{\text{th}}$ of a second. Shutter speeds can range from as long as you want—minutes, hours even day long, or as short as $1/4000^{\text{th}}$ of a second or more.

Slave strobe: Slave strobes are not hooked up to the camera with a synch cord. Instead, they are fired when they sense the rapid change in light intensity created by the master strobe (which is hooked up to the camera) either directly or when it reflects off of the subject. If the slave sensor is aimed into the sun or another light source that is brighter than the master strobe, the master strobe will not be able to create a sufficient increase in light for the slave to sense it. Slave strobes work best with close subjects where the light from the master strobe does not have to travel very far to activate the slave strobe.

Wide-angle lens: A wide-angle lens is one that includes a picture area that is wider than our usual way of seeing. For underwater work, with a 35mm camera, lenses from 24mm to 15mm (with a 110-degree diagonal picture area) would be considered wide, and lenses from 13mm to 10mm (with a diagonal picture area of 180 degrees) would be ultra wide. Above water, even the 24 is considered ultra wide.