

SCARABS

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Special Issue: Photography and Mercury Vapor Lights!

If you collect Scarabaeidae and have not yet tried close-up photography to graphically preserve a record of the beetles and their habitats, using the following methods and equipment will open up a whole new world to you.

Photomacrography, or photography of subjects close-up, is often erroneously referred to as macro photography, which is about expanding photographs to large ("macro") mural-like sizes. Your first question may be "Why should I get involved at all?"

There are several excellent reasons. First, we should at the very least attempt to preserve photographic records of disappearing habitats and the plant and animal life in them. Those of you who have visited tropical rain forests have material which cannot be collected any longer. True, these specimens themselves are priceless. But all the specimens address is systematics. Several decades from now, a photograph showing the beetle in its natural micro habitat may be even more valuable. Not to open a can of worms about another subject, but there are many who feel that biology should be taken into account when working out the systematics of any group. The trouble is, few of us take the time to record biology, either on labels, in written ledgers, or on film. This area is an open frontier, with few people really delving into beetle biology. We can only think of a few.

Aside from recording vanishing habitat and the beetles that go with them, photography can be used to show and demonstrate to others the beauty and elegance of how each beetle has adapted to its habitat. If you are glib and silver-tongued like, say Frank Hovore, give a few lectures to service clubs and other groups. If you collect a small

honorarium, perhaps you can deduct your photographic equipment *and* those trips to the tropics from your taxes.

If you trade specimens with someone in another state or country, why not trade photographs of favored collecting sites and habitats? You might actually learn something (gasp!) about those exotic bugs.

Finally, there is the challenge. Anybody can get a "rare" beetle in a light trap. It is infinitely more difficult to get a photograph of that same beetle in its natural habitat. A case in point would be the many species of *Diplotaxis* and *Phyllophaga*. On an average night in Arizona, literally hundreds of specimens from several species come to blacklight. Are there any records of the food plants? Hardly. Are there any photographs of these common species feeding on foliage? Only a few people are doing work in this area.

Photomacrography is a somewhat technical hobby, because the equipment required is somewhat special. The quality of your photographs is a direct reflection on the quality of your equipment, so buy the finest you can afford. Let us now break this rather complex subject down into simple parts.

The Camera Body

The camera you choose will largely be determined by your pocketbook and convenience. First, consider that the larger the negative, the sharper the photograph. Following only this line of thought, the ideal camera would be an 8 x 10 or 4 x 5 view camera. These *always* need a tripod, and are too expensive, heavy and bulky to be considered here. We need something portable.

something few other collectors have. Remember also that you are a historian of sorts: many insects and habitats may not be around much longer. A sordid thought, but true!

Remember also that photographing an insect is tremendously more difficult than capturing it. Resist the temptation to capture, refrigerate or kill the specimen, then pose it for easy photography. "Nature faking" results in pictures that are scientifically worthless. Stalking an active and wary *Lichnanthe* will prove frustrating indeed. Perhaps one shot in fifty will be a winner- if that. The satisfaction from that one shot will be worth it, however. Kind of like how co-editors Rich and Barney will feel when they finally nail *Phobetus panamentensis* and *Aphodius lividus*.

Photography Contest!

Send in your entries now! The winner will receive his choice of specimens from Rich's extensive *Pleocoma octopagina* series!

Mercury Vapor Lights

There are currently two types of mercury vapor lamps available: the self-ballasted variety which screws into a standard light socket, and the traditional bulb which uses the larger mogul socket.

The self-ballasted lamps are certainly less expensive, less bulky and much lighter than the mogul base lamp. Two could easily be run off your generator. Their light weight makes them a real contender when it comes to choosing what to bring on that next flight to the tropics. Word has it, though, that they do not draw in the variety of scarabs that the other bulb will.

The traditional mercury vapor lamp requires a little work to make, so we will give you some guidance. First, buy the light at Home Depot. Try and

get one with a 175 watt clear (not frosted) bulb. Keep only three things: the bulb, the socket, and the ballast. Throw away the housing, shield, and photocell.

Mounting the socket is up to you. Some collectors make a bracket which mounts on a camera tripod. Others hang the light from a branch or porch. Still others use a stake. Consider a combination setup which will hang from a rope or attach to the handle of a tropics net, which in turn is inserted into a 3/4" pipe nipple welded to a stake. This way, you can get your light high off the ground if you wish, or set up in an open, treeless area, or easily hang it from a limb.

The bulb should be protected from rain, as even one drop can shatter the glass. There are two schools of thought here. A plastic canopy that fits over the bulb is small, light and strong. However, the plastic itself may absorb a significant percentage of the ultraviolet radiation. The other way to go is a clear, thin plastic umbrella. It is small and light, but fragile when open. It will catch the wind, so it must be staked down. However, the thin plastic will block very little ultraviolet.

It is recommended that you put a long (25 foot) cord on the socket. This will give you the flexibility to hoist the light up in a tree if you wish. It is cheaper to buy an extension cord (and cut the ends off) than to buy the cord separately.

To complete this project you will need another extension cord, a regular household receptacle, a "special" receptacle and matching plug, a handle, and an aluminum gadget box measuring 4" x 5" x 6." This box is available only at an electronic specialty store. Radio Shack does not carry any this large. The "special" receptacle and plug is any two-pronged affair that will *not* fit into a regular 110 volt receptacle. A 220 volt old-style air

Electronic Flash

This is a true macro lens, as opposed to the inferior "retro-focus" lenses sold by many off-brands. It will focus down to 1:1 without any accessories. This means that, when focused as closely as it can, say, on a dime, the image of the dime on the film will be life-sized. A *Plusiotis* will take up an entire frame with no attachments. This will be fine for most of us.

For really small insects, higher magnification can be achieved by either attaching supplemental lenses on the front of your lens, or by getting your lens away from the camera body. Bellows or extension tubes can be used for this purpose. However, a 1:1 macro lens virtually eliminates this equipment, unless you are an *Aphodius* specialist.

Most of the modern lenses made today are autofocus, and this lens is no exception. However, most insect photography is done in the manual mode: focusing is accomplished by simply moving the camera. Most tests show, on the other hand, that the computer inside the Nikon can focus more accurately than the human eye. This is especially true in low light. Experiment and choose what suits you the best.

Many people question the new Nikon AF (autofocus) lenses because they are significantly less expensive than their older, manual-focus counterparts. Automated production lines have brought the cost of these new lenses down. Moreover, bench tests show that each AF lens is optically as good or superior to its non-AF equivalent.

Zoom lenses are not recommended for this specialized type of photography, because no zoom alive can match a good macro lens in sharpness and contrast. On the other hand, today's zoom lenses offer an inexpensive alternative to a costly collection of separate single focal-length lenses for general photography.

Photomacrography requires lots of light. The brightest sunlight often is not sufficient and must be supplemented with an electronic flash. A nice macro flash is the Nikon SB-21B, which attaches to the front of the lens. It looks like a "ringlight" which gives flat, shadowless light (not recommended for bugs in the field), but is not. Instead, it consists of two flash tubes, one on either side of the lens. This setup allows "through the lens" (TTL) metering. This means that the camera measures the light falling onto the film and automatically turns off the flash once the correct exposure is achieved. This flash not only works beautifully, but is easy to use.

Another way to go would be to buy a general purpose flash, such as the Nikon SB-24, and attach one or two units over the lens with a macro bracket. Although this flash puts out more light than the SB-21B, you must make sure it is pointed at the subject, which is not a worry with the SB-21B.

Accessories

Once you have decided upon your basic macro outfit, consisting of camera, lens and macro flash, you may wish to add a general purpose flash and tripod as mentioned above.

Extra lenses will greatly expand the versatility of your system. With a plethora of sharp lenses to choose from, making a decision can pose a real dilemma. Once you have close-up photographs of the bug, you should take more generalized shots depicting the habitat, life zone and even weather conditions.

America's greatest general (not closeup) nature photographer is probably Galen Rowell. His work is commonly seen in his books, calendars, magazines, and in his column for *Outdoor Photographer*. Ninety percent of Galen's work is done

conditioner plug will be fine. The receptacle is round, with one prong sideways, and the other "T" shaped. Wire the plug onto the cord for your light. This plug prevents anybody from accidentally plugging the unprotected bulb directly into household current.

Mount the regular receptacle on one side of the cover, and the special receptacle on the opposite side. Make sure you can place the ballast between these two so the cover of the box will slide all the way onto the box bottom. To do this you will have to spend a little time hand-filing the openings to just the right size, then drilling screw holes to fasten the receptacles.

Once you have the receptacles in place, mount the ballast on the base of the box with four 8-32 machine screws, three inches long. Either put spacers or nuts on the bolts between the box and the bottom of the ballast. This allows you to tighten the heavy ballast down without bending the thin aluminum of the box. Note that we are using the pre-drilled holes in the corners of the ballast, not the mounting bracket.

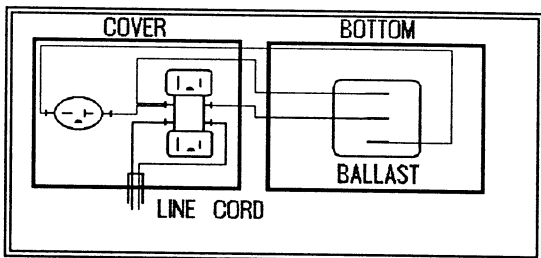


Figure 1

Mount the carrying handle in the middle of the cover, between the two receptacles. Cut off the female end of an extension cord of about 25 feet. Drill a hole in the side of the cover to receive the grommated cord. Since it is difficult to tie a restraining knot in a cord this thick, do this: connect the green ground wire from the cord onto the ground screw of either receptacle. Make sure it is taught. This will provide the needed strain relief for the

cord. Lay the cover upside down next the bottom of the box.

The ballast will have three cheesy slide connectors: a white wire on one end, and two black ones. Pull these off and drill a tiny hole through the lugs to allow solder connections. Wire as in Figure 1 above.

Connect the white and black wires from the line cord to the regular receptacle as shown. The second "neutral" screw on this receptacle gets two wires: one from the ballast where the white wire was connected, and one going to the special receptacle. The middle lug of the ballast goes to the second "hot" screw on the other side of the regular receptacle. The final wire runs from the remaining lug on the ballast to the remaining screw on the other side of the special receptacle.

If the fit of the box cover is close, wrap electrical tape around the terminals of both receptacles to prevent shorts. Close the box carefully and fasten with the four screws provided.

The regular receptacle allows you to plug in extra blacklights and/or extension cords for extra versatility. This is especially nice for those final few minutes after you unplug the mercury vapor lamp, and draw in all the specimens that were perching on nearby foliage, using only the blacklights. The lamp cord connection is idiot-proof and detachable for fewer tangles and easier shipping. Best yet, the dollars you just saved can go toward that next trip.

Home Club sells 175 watt clear replacement lamps made by Electripak (79504). The clear bulbs are highly recommended. Consider packing at least one spare. These bulbs can be packed for airline flights the same way we already recommended for BL tubes: four inch plastic drain and sewer pipe, capped at both ends, and lined with foam or sponge.

Next in line would be a medium format camera, especially a single lens reflex, or "SLR." Most of you already know this simply means that you focus and look through the same lens that takes the picture, so you can see exactly what you are photographing. This is critical, especially in close-up. Although there are several frame sizes within this group, the most popular are the 6 x 6 cm Hasselblad 503CX and the Rolleiflex 6008. Since both of these use incomparable Carl Zeiss lenses, they are excellent choices. However, they are somewhat bulky and very expensive. Each lens alone averages \$2,000.

This brings us to the more common 35 mm format. The quality of the lenses now available is very high, and yet they are relatively small, light, and much less expensive than their bigger brothers.

So now, what brand of 35 mm single lens reflex should you buy? Keep in mind this: all the camera body does is hold the film. Sure, you want the camera to hold the film perfectly flat, so the image will be in focus over the entire frame, but most modern cameras do that just fine.

Choose your camera according to what lens you wish to use. You cannot go too far wrong with a Canon or Nikon. Granted, the Japanese alone are responsible for 52% of the destruction of tropical rain forests, but they make the great 35 mm cameras the professionals use. This is especially true of Nikon.

With the introduction of several inexpensive bodies, Nikon and Canon now allow "the rest of us" access to these superb lenses. If price is no object, there is the Canon EOS-1 and the Nikon F4s, both top-of-the-line professional cameras. The choice of most professionals is, and has traditionally been, Nikon, so let us talk about them. The Nikon F4s body, for

example, sells for about \$1,500. A notch below this is the Nikon 8008s, selling for about \$575. This is an awesome camera, and does most of what the F4s does. This is highly recommended, and is designed for professional and serious amateur use. The Nikon 6006 is geared for amateurs, but is still good. There are also less expensive bodies. Minolta, Pentax and Olympus are also good brands.

If you also wish to take photographs through a telescope or microscope, the camera body should have a mirror lockup feature. At high magnifications, the slightest vibrations, including the movement of the SLR camera's instant return mirror, can cause a blurred image. To overcome this, the image is focused, then the mirror is locked in its upward position. The photographer then waits a few seconds for the vibrations to dissipate. The shutter is then triggered using a long (18" or more) cable release. Of the Canon and Nikon models mentioned, only the Nikon F4s has this feature.

The Lens

The reason we bought that name-brand body was to use that name-brand lens. It makes no sense to buy a Nikon body and match it to an off-brand lens. Staying in the Nikon line, we have only one real choice: the AF Nikkor 105 mm f/2.8 macro lens. A longer than "normal" (50-60 mm) focal length is necessary to allow you to stay further away from the subject to avoid spooking it before you can snap the picture. This lens is now being sold for just under \$500, but is worth it.

An interesting aside about this lens may be in order. Pros use focal lengths of 85-135 mm for glamour and portraiture shots. However, test reports in the photo magazines call this lens "too sharp" for this kind of work: every blemish or flaw on the model's skin shows up crystal clear in the photograph!

with two Nikon lenses: the 24 mm wide angle and 85 mm short telephoto.

In fact, most pros rarely use the "normal" 50-60 mm lens. If you wish to have such a lens, Nikon makes a great 60 mm macro lens which will serve this purpose. It will do what the 105 mm lens does, but at a working distance too short for most insect work.

If you own the 105 mm macro lens, owning a telephoto lens of a longer focal length might be wasted because you will seldom use one. If you are interested in birds, monkeys, and the like, a telephoto lens of 300-800 mm would be handy, albeit expensive. Consider some of the fine zoom lenses available if your budget is tight.

Herbert Keppler recently did a nice two-part series on zoom lenses for his column in *Popular Photography*. His conclusions: buy a name brand zoom, and select a 28-200 mm zoom if one is made for your camera. If not, 28-100 mm zooms are great, but rare in autofocus mounts, so you may have to settle for a 35-105 mm or 35-135 mm zoom. He suggests it would be better to have two zooms: a 24-50 mm and a 70-210 mm zoom. Keppler suggests you will never miss the gap between 50 and 70 mm.

Today's fine camera's often have interchangeable finders and focusing screens. However, the standard prism finder and focusing screen on most cameras are so good, purchasing these extras is unnecessary.

Protect your investment in a fine camera bag. Look at Tamrac's extensive line. Lowe and Domke also make sturdy, well-made bags.

Where To Buy

Buying locally is fast and you have instant support. You will have to pay a little more, plus you will have to pay sales tax.

New York has several reputable mail order houses featuring cutthroat prices. A copy of *Popular Photography* magazine will list them all. Make sure you find out what the shipping charges are *before* ordering. Avoid "gray market" merchandise that does not have warranties. Nikon, for example, has both USA and foreign warranties on their cameras, lenses and flashes. Make sure you get the USA warranty; it is the important one. Adorama is fairly inexpensive, yet fast. Executive Photo is good, low-priced, but a little slow. Avoid Foto Cell. Although they advertise the lowest prices, they "raise" them after the advertisement "went" to press, and they make you pay extra for the warranties that should be included regardless. B & H is reputable.

Film

If your photos may be published, you should use slide (transparency) film. Advantages are the low processing costs and the fact that the slide itself is the original (or "first generation") film, therefore sharper than any print. Prints, of course, are "second generation," because they are made from a negative. Print films are called "negative" because of this. It is far easier for a publication to print from a transparency than from a negative.

Kodak (Kodachrome 25 and Ektachrome 64) and Fuji (Fujichrome 100) all are great. The ISO numbers often seen with films indicate the film's speed, or sensitivity to light. The higher the number, the more sensitive. The drawback is that the faster, more sensitive films are grainier. Enlargements made from fast films are not as sharp as those made from a slow film. Furthermore, slow films (with low ISO numbers) also exhibit more color saturation. They reproduce colors that can be literally "brighter than life." A slide film of ISO 200 will be fast enough to capture virtually any close-up photograph in low light with the flash equipment described above.

apertures, stop down, and use a tripod. The camera is held away

from the subject. The lens is focused on the subject. The shutter is pressed. The film is exposed. The camera is held closer to the subject, which is a photograph.

Then, the photograph is taken. The camera is held close to the subject. The lens is focused on the subject. The shutter is pressed. The film is exposed. The camera is held close to the subject.

The camera is held close to the subject. The lens is focused on the subject. The shutter is pressed. The film is exposed. The camera is held close to the subject.

The background is glass, which is used to distract the eye. The background can be seen in the photograph.

Kirby says this: a hole drilled in the plastic. The hole holds the angle of the lens.

When Kirby says celebratory, he is talking about the bellows. The bellows are held horizontally and placed vertically. They are set up, which is a many-layered structure at up to 100 feet. The slender lens is held with compressed air. This is another way to get

General Considerations

Fuji has recently come out with a new print (Reala) and a new slide (Velvia) film which are garnishing rave reviews for their brilliant colors and fine grain. They are a little slow for close-up photography, so try them and see if you feel they are worth the extra cost.

Do not buy film or processing mailers mail order. You do not know if the film you are getting is fresh, or what will happen (or has happened) to the film during shipping. Buy instead from a busy photography store, one that moves lots of film. The good ones keep their film refrigerated to keep it fresh, and you should do the same when you get home. A freezer is also good. Let your film warm-up to room temperature before you load it into your camera to prevent condensation inside your camera.

Settings

With the setup just described, camera settings are fairly simple. Your only worry is depth-of-field. This means that, in close-up photography, the zone of sharpness around the subject, from front to rear, is very narrow. The higher the magnification, the narrower this zone is. Therefore, the extremities of a highly-magnified bug may be out-of-focus.

To accommodate this problem, set the f-stop on your lens to its highest number. On a good macro lens, this will be $f/32$. This closes the diaphragm to its narrowest aperture, allowing for the widest depth-of-focus (depth-of-field), but allows very little light to fall onto the film. This is why lots of light is needed for this type of photography.

To ensure that the camera does not change this setting, set the exposure mode on the camera to "A" or aperture priority. You need not worry about shutter speed. Choose manual or autofocus, set your flash unit to "TTL" and yer off and shootin,' automatically, of course!

To get those really crisp, professional-looking results, keep your lenses clean. A commercially made blower brush is best. Avoid using a liquid lens cleaner and lens tissue whenever you can, as these will eventually wear the factory lens coatings off the front lens element.

Use a tripod often, especially when not using flash. A rock-still camera will always take a sharper image than one that is hand held, regardless of the shutter speed. Professionals use tripods almost every time they shoot. A good tripod is the Bogen 3021. If you want first cabin, then you want the Gitzo with its lifetime guarantee.

You may also experiment with inserting colored posterboard stock behind your subject to present a clean, uncluttered background. Otherwise, your subject may get "lost" in a flurry of leaves and branches. Generally, you will find this unnecessary due to limited depth-of-field.

The Sweet Spot

It is commonly thought that stopping a lens down to its smallest aperture ($f/32$ or $f/22$) will produce the sharpest image. This is not true. Doing this will simply give you the greatest depth-of-field possible with that particular lens. Most lenses are actually sharpest in the middle of their aperture range. This is why so many pros shoot at $f/8$ when doing general photography. They call this aperture the lens' "sweet spot." Therefore, $f/8$ is usually used when photographing a flat or far-away subject. In other words, use $f/8$ when depth-of-field is not a consideration.

The Hyperfocal Setting

What if you are taking a photograph and want everything in focus, from infinity to just in front of the lens? There are two things you must do. First, set the lens to its minimum