

Insect/macro photography

by Neil Hodges

What began as a challenge many years ago – to take lifesize or bigger photographs of insects of interest to fly fishers - became a long, slow learning curve involving thousands of trial and error photographs. Close-up equipment was and is freely available; however techniques and expertise were acquired mostly by experimentation because, back then, photographic dealers were happy to sell macro equipment but few had any practical hands-on experience. Nowadays digital imaging allows the photographer to instantly view images and save the best with all the subsequent advantages offered by computers and image processing software. My collection of lenses, macro equipment, flashes and much, much more eventually grew to rival your esteemed editor's fly tying paraphernalia and weighed in at 20 kg.

Most zoom lenses supplied with currently available 35mm single lens reflex cameras have a "macro" facility that allows $\frac{1}{4}$ or even $\frac{1}{2}$ life size images to be made. Advancing from the $\frac{1}{2}$ life size to 1:1 or images the same size as the insect or fly being photographed requires the use of close up equipment, magnifying two or three times and, such is the expense, that it usually means digging into your savings or putting off acquiring that new 00 wgt Sage Rod.

Equipment for macro photography:

Camera: a single lens reflex camera, film or digital.

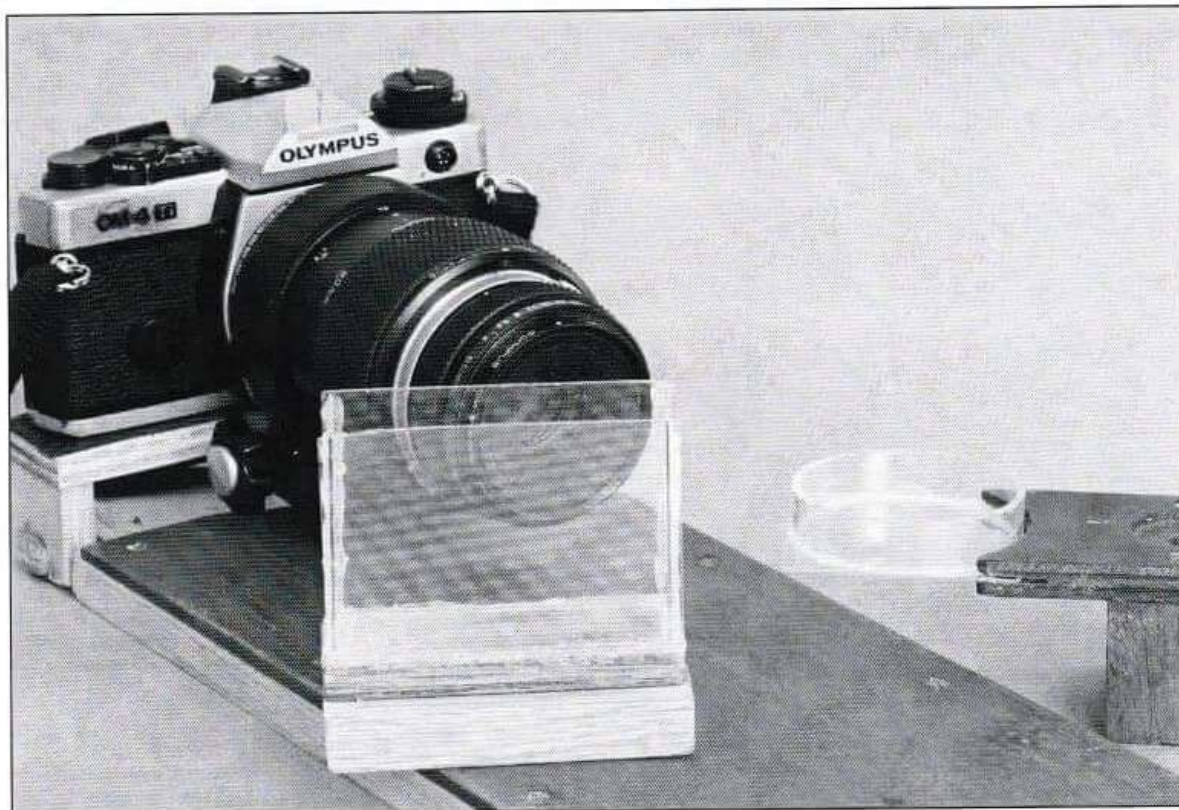
Lens: Any lens will be able to focus more closely than it was designed to do if you add space between the camera body and the lens. Macro lenses, designed for close-up photography, are manufactured with an integral extension mechanism that allows the subject to be photographed on a 1:1 ratio i.e. life size without the need for accessories.

Increasing this magnification requires accessories such as bellows, extension tubes, teleconverters or auxiliary closeup lens attachments. Bellows and extension tubes achieve the same goal, achieving extension by mounting between the camera body and the back of the lens and thereby magnifying the subject being photographed.

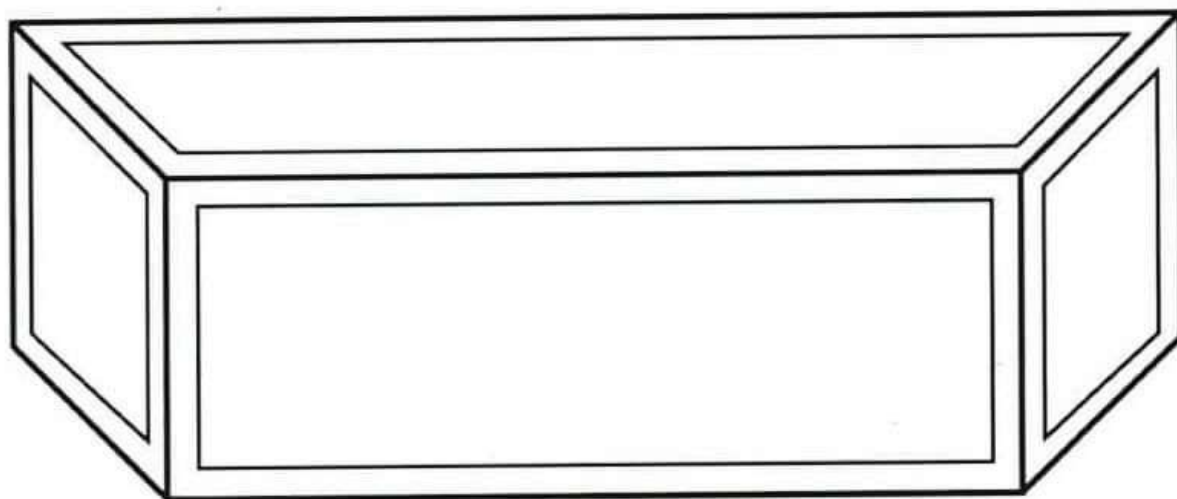
Bellows are not often used today as only one or two retain the auto exposure features and they are bulky and easily damaged. Although allowing extreme magnification in the order of 10X, they are very expensive and very specialised items.

Auto extension tubes are supplied in sets of three or singly, They retain the auto focus and exposure systems standard with all modern 35mm cameras sold today. The longer the focal length of the lens the longer the extension required. A 50mm non-macro lens plus 50mm extension, or a 50mm macro lens plus a 25mm extension tube gives a 1:1 ratio and increasing the number of extension tubes results in more magnification.

Teleconverters, like extension tubes and bellows, fit between the camera body and the back of the lens but are more expensive because they contain optics. The most commonly available teleconverters increase magnification by 1.4x and 2x – this applies to any lens to



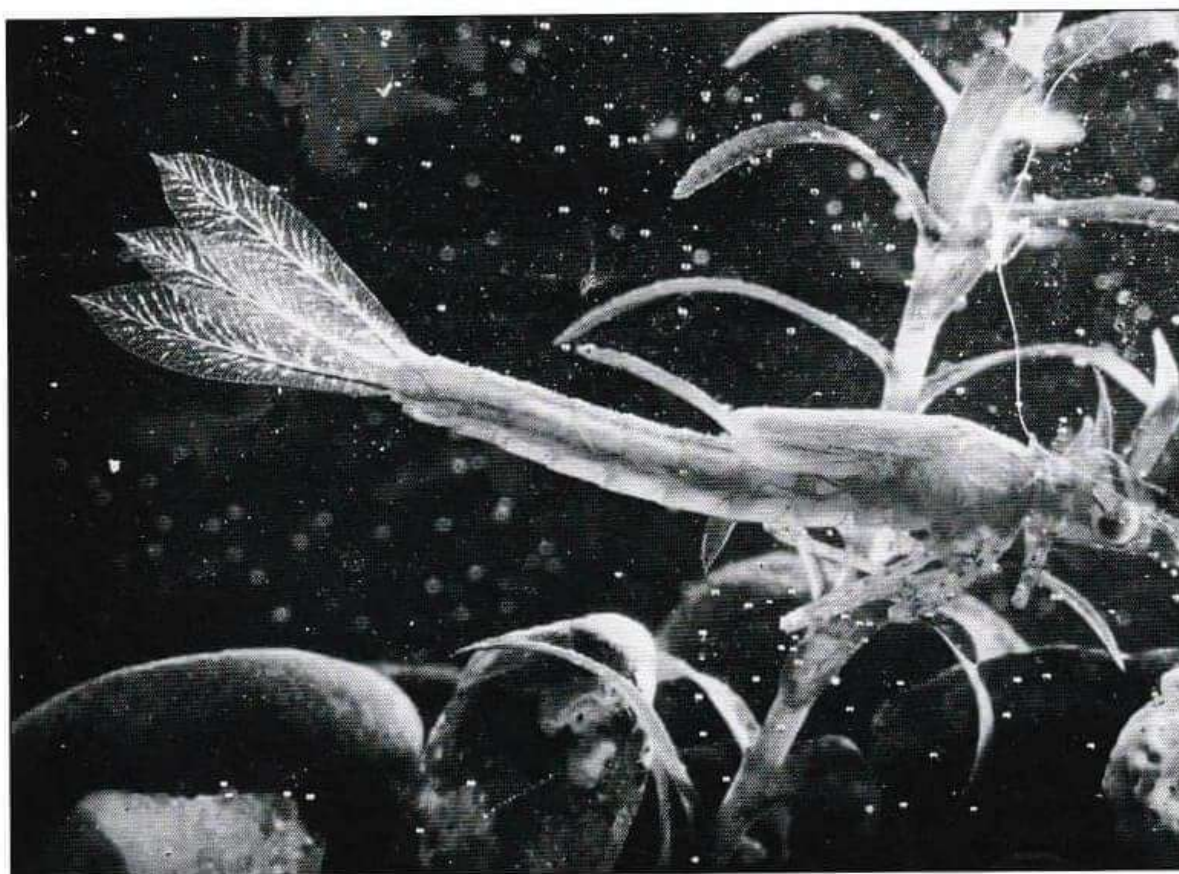
An SLR camera fitted with a macro lens and two types of aquaria built by the author for photographing aquatic insects in the water.



An aquarium built with a long back and short front to avoid the problem of the rear corners intruding into the picture.



A close up of a dragon fly nymph taken by the author in an aquarium.



A photograph of a damsel fly nymph. Note how the bubbles in the water reflect the light of the flash. Photograph by Neil Hodges.

which they are attached – but there is a loss of light involved, one stop for the 1.4x and two stops for the 2x.

Supplementary closeup lenses that screw onto the front of the lens. If supplied by a reputable manufacturer such as Canon, Nikon etc, they involve no loss of light and picture quality is excellent. These lenses are known as “achromatic doublets” because they consist of two lenses, designed to reduce chromatic aberration or colour flare, that are bonded together. Canon market two such lenses, the 250D which is suitable for lenses between 50 and 135mm and the 500D designed for lenses of up to 300 mm.

Problems Unique to Macro Photography

Loss of light

Any accessory fitted between the lens and the camera body apart from the accessory lenses, will absorb light. The greater the extension the greater is the amount of light lost. To compensate for light loss the lens aperture might have to be opened 1 or 2 f stops or the shutter speed decreased from for example 1/125 of a second to a 1/60 second or longer. An alternative is the use of a faster or more sensitive film. The slower films usually recommended for good quality pics. Fuji Velvia slide film is available as 50 ASA and recently a 100 ASA film has become available. Live insects although in a small tank still tend to move about for the first few minutes. On digital cameras the ISO rating can be increased with a concomitant loss of quality.

Depth of focus

The greater the degree of magnification to the smaller is the depth of field or area of acceptable focus. This is often only 1 – 2 mm or even in the order of 0.5mm. Maximum depth of focus is achieved by use of the smallest f stop or lens aperture/opening, F8, 11, 16 and 22. Even F8 is often a compromise.

Shutter Speed

Due to light being lost the more you extend the lens away from the film plane or digital sensor, often the only alternative is to increase the length of the exposure time and then camera shake becomes a problem as exposures of 1/16 or 1/8 are often used. This can be compensated for by the use of a tripod and cable release, using the camera's mirror lockup facility and/or flash which freezes movement. An increasing number of, albeit very expensive, lenses are becoming available with image stabilising technology which cancels out camera shake and allows faster shutter speeds and/or smaller apertures to be used. Unfortunately this technology is not, as yet, available on pure macro lenses which is surprising because macro photography, by definition, requires very precise focusing and, very often, slow shutter speeds. Patience is a very important ingredient in successful macro photography.

Lighting

To compensate for this light loss I initially purchased four flash units. All could be used together and still retained the through-the-lens auto exposure. This resulted in a very happy photo dealer, but, when photographing aquatic insects in the special glass tanks I made for the purpose, bubbles or any tiny speck of debris in the water reflected flash light like you cannot believe. This resulted in some spectacular psychedelic images that were not exactly what I was looking for so I went back to the most readily available light source

– sunlight. This together with a few small bits of foil as reflectors to fill in shadows has, since then, been my mainstay. By carefully positioning the small tank or fly and camera, frontal, side and back lighting is easily achieved and the viewfinder of your SLR camera makes it easy to determine what your image will be like. Remember to allow for correctly exposed images by using the exposure compensation facility and taking slightly under and over exposed images. Often a slightly under exposed image will be the one chosen.

Aquaria

Small glass aquariums for side view photos, greatly facilitate the closeup photography of aquatic insects. They are best constructed using the thinnest glass available or perspex for the front and back of the tanks.

For the sides and bottom of the glass tanks I utilise blank microscope slides that I obtain from the local pathology lab or from a vet. Glass tanks can be glued together with clear silicone sealer but gluing perspex requires a special cement called Tenzol which softens the surfaces to facilitate bonding. It is obtainable from Maizey (021 5119783).

The dimensions of the first tank I constructed were initially determined by the glass available and I ended up with a rectangular tank, width 8cm, height 6cm and depth 2.7cm.

A rectangular shape allows the tank to be turned a few degrees to keep the body of the insect in focus or parallel to the film plane and within the small area of maximum depth of focus without a back vertical corner intruding into the picture. A small thing, but important as far as final images are concerned. (Some photographers, to avoid this problem, build trapezoidal aquaria with the back face longer than the front face – see illustration).

For photos from above, a white saucer can be used. Jake Alletson in Natal and more recently Dean Riphagen and Tom Sutcliffe have taken outstanding pictures using this very simple method. Tom has a better container and only allows just enough water to cover the insect or they end up hard against an edge.

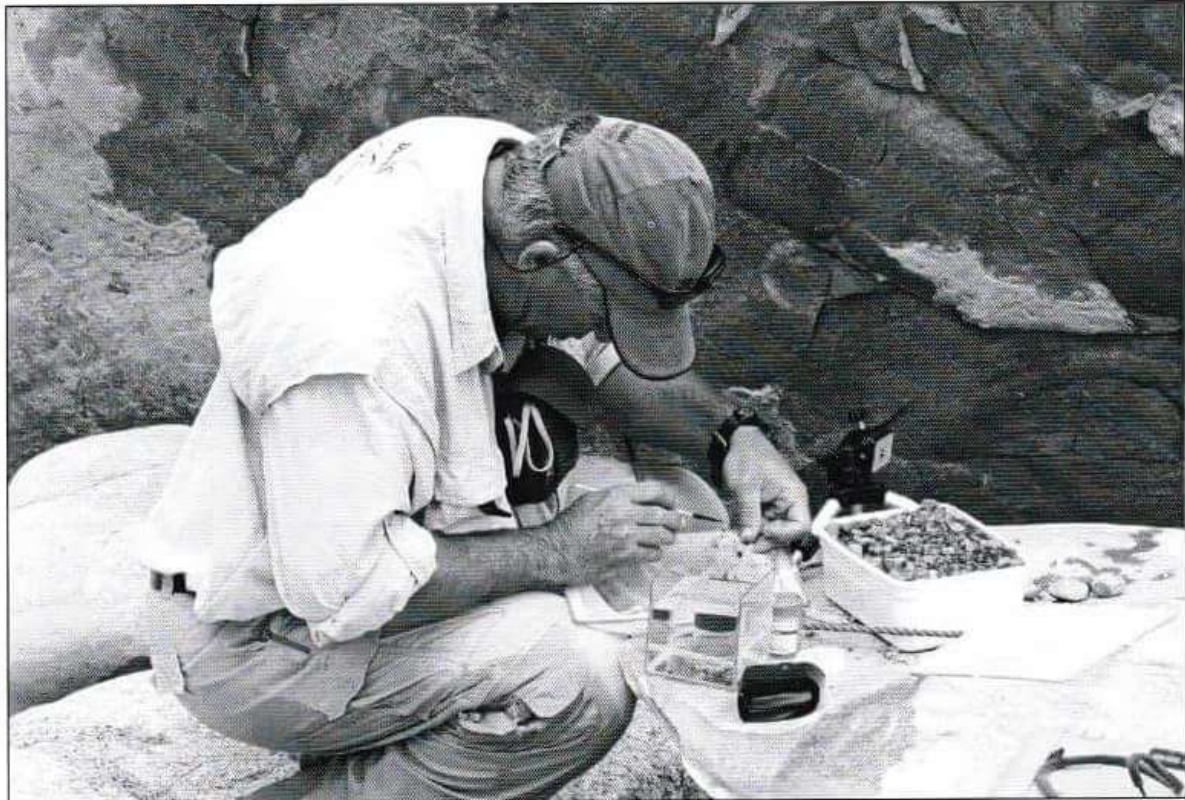
Photography Board

Using my new tank I exposed the first film with the aid of a tripod and block of wood upon which the tank was balanced. It quickly became obvious that a single board which allowed the camera to be firmly fixed to one end and long enough to allow for different distances between camera and tank, dependant on the magnification ratio and focal length of the lens, was the only way to go. Again trial and error produced a workable board, by no means the Alpha and Omega as many different solutions are no doubt possible. A small amount of pivoting movement was built into bridge to which the camera is fixed to allow for greater control of composition and focus. The board was a simple to make, easy to transport and could be used at the waters edge.

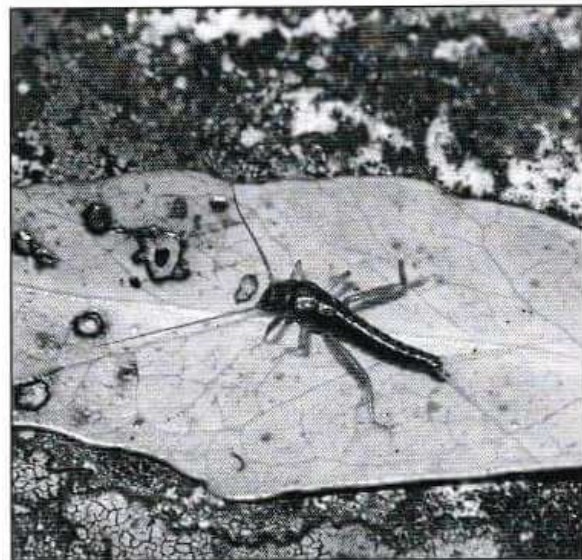
The board made insect photography a lot easier because, while looking through the viewfinder I could use my right hand to activate the shutter release and I kept the insect in focus by moving the tank with my left. Photography was always in the auto mode.

Other Accessories:

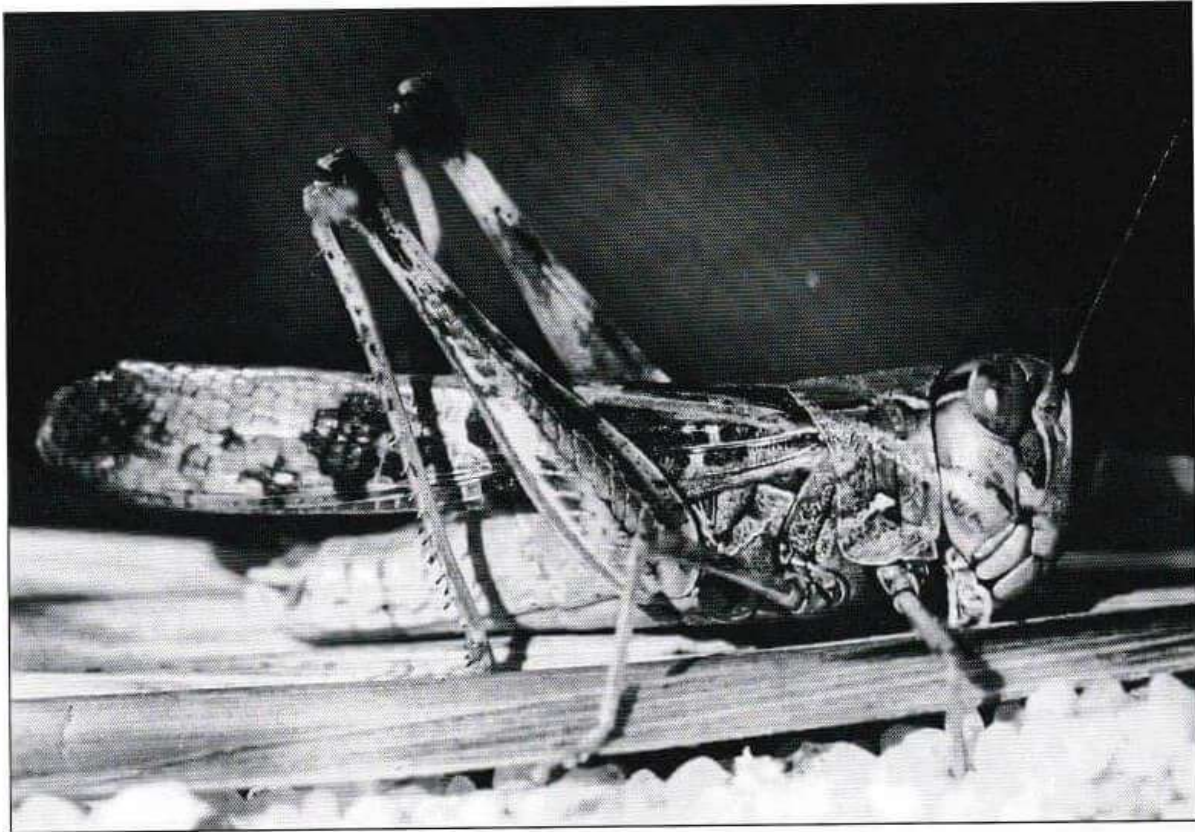
Tweezers. Tweezers with flat ends used by stamp collectors proved ideal. Most subaquatic



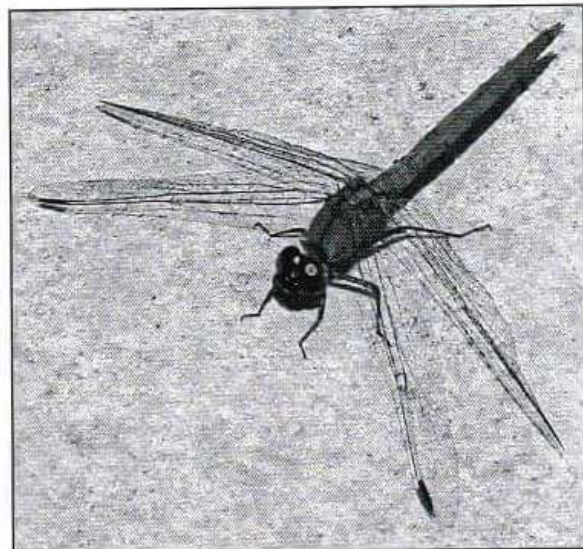
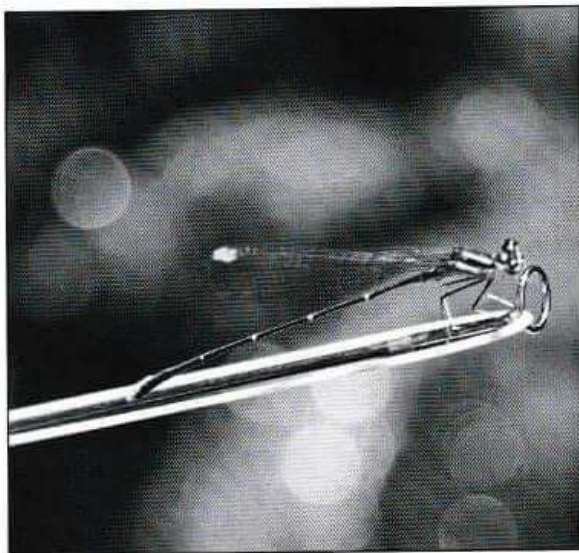
Eddie Gerber on the Smalblaar stream collecting aquatic insects to photograph.



A mayfly adult(left) and a stonefly nymph photographed by Tom Sutcliffe with his Canon 20D digital camera fitted with a Canon 100mm macro lens.



A grasshopper fills the frame in this photograph taken by Neil Hodges.



Damselfly (left) and dragonfly adults photographed by Tom Sutcliffe.

insects are delicate and thus easily injured so the tweezers were usually slipped under the insect which was then lifted from its watery habitat and into the tank. Only very active and tough dragonfly and stonefly larvae could be lifted carefully with tweezers.

Tiny and small river pebbles were used for side on shots to add a dimension of reality and keep the insect off the bottom of the tank. Keep the pebbles moist because dry pebbles produce a myriad of air bubbles that take an hour or two to dissipate.

Aquatic weed can also be used as a prop and kept in place by wrapping a small length of electrical solder or Loon soft lead around one end.

Adult insects can be photographed equally successfully in the tank. Simply use a piece of grass or stick as a prop and another microscope slide as a lid. Keep the lid in place by using a couple of small pieces of Prestik at either end.

Any queries can be directed to the author at 021 7123295.

Editor's note: Macro photography is a demanding discipline, most specifically because depth of field is minimal and camera shake an ever present problem unless flash is used.

The arrival of digital cameras that can produce publication quality results has been hugely beneficial because the results can be immediately assessed and corrections made.

Fifty mm macro lenses require a subject-to-camera working distance of about eight inches – a distance that is often too close to be comfortable, particularly if the subject is a nervous insect. The 100 mm macro lens doubles this distance and is our choice.

Tom Sutcliffe and I believe that the current Canon range of digital cameras and lenses offer the best results. The Canon 20D, an eight megapixel camera combined with a 100mm Canon macro lens delivers pictures of exceptional quality that are not discernibly inferior worse than the quality produced by the Canon IDS1, the company's 16 megapixel flagship model. It is the camera of choice of Denver Bryan, an American whose photographs of fly fishing, hunting and wild life have graced the covers of numerous international magazines such as *Fly Fisherman* and *Gray's Sporting Journal*. A less expensive model that would produce very similar results is the eight megapixel Canon 350 D.

What makes the 100mm F2.8 macro lens even more versatile is the Canon 250 D achromatic doublet, which provides greater magnification, no discernable loss of quality and enables one to work at slightly greater distances. The lens element on the 100 mm lens is so deeply recessed that one would not normally need a lens hood when shooting outside. However, this changes when the doublet is screwed to the front of the lens and a lens hood is then required to prevent flare.

The most advanced macro lens currently available, the Canon MP-E65mm f2.8, gives reproduction ratios of up to five times life size without the need for extension tubes or bellows.

The use of flash eliminates camera shake. This makes hand held photography possible but results in a black background because the level of light generated by the flash at close range dominates the ambient light.

Both these lenses can be coupled with the Canon MR-14 ring flash that mounts on the front of the lens. It has twin tubes that enable one to vary the light on either side of the picture thus, in some measure, ameliorating the flat, even lighting that characterises ringflash shots.

This flat lighting can be eliminated to an even greater extent by using the Canon MT-24EX Macro Twin Lite. Like the MR-14 ring flash, it mounts on the front of the lens but the two flash heads are moved further away from the lens and their position is adjustable giving two light sources instead of the single light source provided by the ringflash.

Many professional entomologists now regard the ultimate currently available outfit for insect photography as the Canon 20D body fitted with the MP-E65mm F2.8 macro lens and the MT-24EX Macro Twin Lite flash gun. At 5x this lens would enable you to fill the frame with the eye of a grasshopper but, because the camera would be only centimetres from the subject at that magnification, depth of field is so minimal that the lens is designed for tripod use only and does not have an auto-focus option.

Since the turn of the last century camera designers have utilised the Schiemplug effect that monorail, bellows cameras allow to extend depth of field. The innovative Zoerk company (www.zoerk.com) provides an attachment that enables 35mm cameras to utilise the bellows effect to create greater depth of field. The Zoerk Multi Focus system enables depth of field to be increased by tilting the lens without the bulk, weight and expense that monorail, view camera systems entail.

Under studio conditions when photographing tiny insects or micropatterns, an even greater depth of field, from a few centimetres to infinity, can now be obtained by combining the Canon 20D and ID SI bodies with a monorail bellows system created by the Dutch Calumet company. The Cambo Ultima 35 is a monorail, bag-bellows optical system that uses the Canon body as the capture device. It requires the use of an auxiliary lens such as the Schneider series but achieves view camera levels of versatility in terms of swings, tilts and lateral and vertical shifts at a substantially lower cost than the purchase of dedicated, medium format digital view cameras such as the Sinar or Rollei X-Act2. (For reviews type Cambo Ultima 35 into a search engine such as Google.)

And, for the first time, macro photography becomes possible underwater because the Canon 20D with macro lenses can now be used inside a waterproof housing made by the American company, Ikelite (www.ikelite.com). The Indianapolis—based company has been making underwater housings for cameras since 1962.

One technological possibility that macro photographers are hoping manufacturers will incorporate in their range of macro lenses is image stabilising which will enable the photographer to reduce camera shake in natural light conditions by using higher shutter

speeds.

For professional photographers in Cape Town, Mike Ormrod of Orms in Canterbury Street, 021 4653573 or www.orms.co.za has become synonymous with outstanding service

At the time of writing, May 2005, Orms supplied the following prices for an outfit that would provide outstanding images of insects or fly patterns, indoor or out. The camera's auto-focus facility and auto-exposure calculation enables even the beginner to get excellent results, results that will be enhanced by the use of a tripod, where possible.

Canon EOS 20D body	R12 500
Canon 100mm F2.8 macro lens	R 4 800
Canon 250 D achromatic doublet	R 1 050
Canon Right Angle view finder	R 1 900
Canon RS-80N3 Cable release	R 475
Canon MT24 macro Twin Lite flash	R 7 600
Total	R28 325

The Canon 350D body costs R7400-00. The Canon MP-E65mm F2.8 lens costs R9 900 and the Canon MR14 Ringflash R5000-00.

