DIXIE

EXPERIENCE YESTERDAY, TODAY!

Send for Our New 1987 Catalog.

DIXIE GUN WORKS has been keeping the pioneer spirit alive for more than 30 years. As THE source for muzzleloading guns and supplies, original and reproduction parts, and authentic clothing, etc., for the blackpowder enthusiast, the NEW 1987 edition of the Dixie catalog is almost 600 pages including over 7,000 different items, and describing the largest selection of blackpowder guns and accessories in the world! Send in the attached coupon...and relive yesterday's world, today.

INFORMATION
(901) 885-0700
ORDERS ONLY
1-800-238-6785

DIXIE GUN WORKS, INC.
GUNPOWDER LANE, UNION CITY, TN. 38261 Dept. 7/12

NAME _____
STREET _____ CITY _____ STATE _____
ZIP _____

SEND COUPON AND $3.00 TODAY
CATALOG SHIPPED C.O.D. $5.00
☐ CHECK ENCLOSED
☐ C.O.D.

Fishing

The Magic Feather, and Other Vaguely Fish-Related Stuff (Including Balloons)

BY ED ZERN

How a savage, unwarranted owl attack led to greater wisdom, and other things

If you care to poke around on top of my head some day when you've nothing better to do, you'll find the faint traces of a 2-inch-long scar. Lots of people, I suppose, have 2-inch or even 6-inch scars on their scalps and don't regard it as a particularly big deal. Nor do I. But I want to make the distinction that whereas their scars were probably caused by having been whacked on the skull with a shilleleh or a 4-iron or a bottle of slivovitz or sliced with a machete or bashed with a blunt instrument or some other run-of-the-milieu way of acquiring a scar on one's noggin, mine was inflicted by a great horned owl. I was walking through some woods a long time ago, on a very cold and very dark winter night, with no lantern or light but on a path I knew well, and was wearing a coonskin hat made from a raccoon one of my dogs had killed. It was a peachy hat, and only smelled in damp weather. The owl struck it with such force that I was stunned for several seconds, and one of his talons cut my scalp so deeply that I roused my family doctor and had him put in a couple of stitches.

That was the first time I became aware that certain natural substances—hair or fur or feathers—can be seen by certain animals, especially carnivorous predators, on nights so dark that the human eye is unable to distinguish objects smaller than a house or tree. Curious as to why even the hungriest owl (and it *had* been a hard winter) would attack a human being, I learned that just as dogs are able to hear sounds too high-pitched to be audible to humans, so some animals are able to see light rays, such as ultraviolet, that are outside the range of human vision. What the owl had seen was my coonskin cap, reflect-

Smiling bravely, the Fishing Editor takes leave of the ground via the Big Bag

PHOTOS BY DOYLE KLINE

to be a hard one for a lot of people to swallow; I have shot about the same amount of game with the 7x57 as the 7mm magnum and if with the same shot placement the magnum kills any better I have been unable to see it." Many a hunter with a sporterized 7mm military Mauser, or one of the sleek new Ruger Model 77's in that caliber, might agree.

O'Connor didn't just use the little 7 on deer. He and his wife Eleanor used 7x57's extensively in Africa and took animals up to the size of eland which are considerably larger than elk.

It *is* hard to swallow that a little cartridge with about half the recoil of a 7mm magnum so efficiently handles animals of that size. Maybe even tougher to chew is that W.D.M. (Karamojo) Bell used the 7x57 with 175-grain full-jacketed military bullets to kill elephants. Some say he killed more than 1,000 tuskers, most with the 7x57.

Granted Bell was a cool and calculating shot. But to get through an elephant's skull the cartridge had to be doing something, too. And its trick is apparently its great efficiency in utilizing those expanding gasses that push a bullet out a barrel.

Perhaps the best way to compare efficiency is to write in terms of percentages.

Using the old Powley formula for computing recoil, a rifle weight of 7½ pounds for each gun, and the identical 150-grain bullet, we find that the little 7x57 produces 48 percent less recoil than the 7mm Remington magnum, yet suffers only 2.4 inches more bullet drop at 300 yards if both rifles are sighted in for 200 yards. Retained energy at 300 yards is 21 percent less than the magnum, but at more than 1500 foot-pounds the little 7 still has enough to kill any deer. So with the magnum you gain 2.3 inches in trajectory and 21 percent retained energy that you really don't need for whitetails.

The .308 has only slightly less convincing efficiency, 32 percent less recoil, about 2 inches more drop, than the 7mm magnum, and has the important advantage of being available in pump, autoloading, lever, and bolt action. The hunter has his choice of the rifle length and style he feels he needs for fast handling and accuracy. No magnum today offers that form of versatility.

THE MAGNUM'S advantage on deer-sized game is at very long range, beyond 300 yards where trajectories of most big bore non-magnums turn to worms. How much advantage, really, is that?

Here's Jack O'Connor again: "Most game is killed at 200 yards or less, but many of these kills get stretched out when processed through a typewriter."

Remember that to kill a deer is not just to hit the animal, but to hit a vital area. Hit him in the rump and he'll likely run off. The heart-lung area of a whitetail is approximately a 10- to 12-inch circle that gets much, much smaller at long range. The front sight of most open-sighted guns will blot out the whole deer at 500 yards.

The average factory rifle does well to group within 2 to 3 inches at 100 yards, 8 to 12 inches at 400 yards, and this is from a solid bench rest with time to squeeze the trigger. Under hurried hunting conditions that are rarely so stable I don't think the average hunter can consistently hit the vital area of a whitetail at 400 yards whether he shoots a magnum or a cannon. Even with a range-computing, holdover-correcting scope, the man behind the rifle still must hold steady enough and squeeze perfectly. And if he does all of that the rifle still may not group well enough. Thus the long-range magnum cartridge, and the long-range computing scope, are best adapted to the experienced, serious marksman who has tuned his rifle and himself to perfection.

Magnums too often encourage hunters lacking those preparations to shoot beyond the accuracy capability of man or rifle. Certainly the "killing power" is there, but so is the missing and crippling power.

The flat trajectory of magnums can help accuracy, just as their recoil hurts accuracy. Which is most important? In observing several hunters trying silhouette shooting for the

(Continued on page 91)

CRAFTSMAN 10-IN. TABLE SAW OUTFIT. $100 OFF.*

FULL ONE-YEAR WARRANTY
If within 1 year from date of purchase this Craftsman® table saw fails due to defect in material or workmanship, contact Sears and Sears will repair it free of charge.

NOW $279.95

Available in most Sears retail stores. Prices and dates may vary in Alaska and Hawaii.

ON SALE NOV. 4-24

- Big 24-in. rip capacity.
- Pre-lubricated 1-HP induction run motor that develops 2-HP.
- On and off switch with removable key.
- Formed steel leg set.
- Tough cast iron table.
- Two 10-in. x 27-in. extensions.
- Miter gauge and self-aligning rip fence.
- Chisel tooth saw blade.
- See-through blade guard.
- Exclusive Exact-I-Cut Indicator lines up cut ahead of blade.

Sears

WHERE AMERICA SHOPS FOR VALUE.

SEARS SUPER VALUE

*This is the minimum savings nationally. Regular prices vary in some markets.

Traveling by hot air balloon, claims the author, has its distinct advantages: no potholes, traffic jams, toll booths, speed traps, detours, or flat tires

ing a wave length of light that said "Eats!" to a starving raptor but was invisible to humans, and that it had assaulted the coonskin under the impression that it was being worn by a coon, or by some other edible critter.

(I also learned that attacks by owls on people wearing fur hats on dark nights are not rare, at least within the winter range of the larger, more aggressive species; a couple of winters ago I read of a woman in Massachusetts who nearly lost an eye one dark night when "a large white bird," probably a snowy owl that had got pretty far off course, punched its talons through her mink-trimmed hat and into her scalp.)

Not long after the owl episode I read somewhere about a trout fly so deadly it had been banned on many English trout streams, and was apparently threatening to wipe out all salmonids in Britain if anglers were free to use it. It was called the Alexandra, and when an English friend wrote to say he was coming to the U.S. for a visit I asked him to smuggle in a couple of the devastating flies. When he finally came by and delivered the Alexandras I was terribly disappointed. I'm not sure what I had expected an Alexandra to look like—something on the order of a hand grenade, perhaps—but in truth the Alexandra is simply a rather ordinary looking wet fly with a silver-tinsel body, a red tail, a black throat-hackle and for the wing, several strands of so-called "peacock sword," a particularly iridescent and colorful part of the peacock tail feather. I tried fishing the forbidden flies, since they weren't yet forbidden outside the stuffier circles of British chalkstream anglers, but although I caught a few Brodheads trout on them they didn't produce the sensational results I had read about, and so I went back to my then-favorite wet flies: the Leadwing Coachman, the Dickey, and the Royal Coachman.

My favorite streamer fly at that time was the Light Edson Tiger, which the late Hoyt Holland had taught me to tie and use with considerable success on the Esopus and other New York State rivers. But it wasn't for quite some time that I noticed the one characteristic shared by all these flies despite their difference in size and appearance. *Each of them was tied with peacock herl as a prominent part of the pattern.* In fact, in the case of the Leadwing Coachman, the Dickey Fly, and the Light Edson Tiger, the entire body of the fly was predominantely herl. And after many instances of having had these patterns produce trout or smallmouth bass after herl-less patterns had swum unmolested through good water, I began to believe, and continue to do so, that peacock herl especially, and probably all natural fur and feathers to some degree, reflects light in some way or some wavelength that's attractive to fish and stimulates their feeding responses.

It's possible, or even probable, that the jungle-cock "eye" on so many salmon-fly patterns—a feature often dismissed as being more attractive to the angler than to the fish—is actually reflecting some special come-hither wavelengths of light that spark a response in predatory fish. And while artificial jungle-cock eyes, introduced since the ban on importation of jungle-cock capes, may look like the McCoy, they can't have the same light-reflecting qualities. By the same token, I'm sure that dubbings of seal, bear, fox, or any other natural fur or hair are possessed of this quality, even though I've found the new synthetic dubbing materials to be productive as well as considerably handier and easier to work with. (Or with which to work.) (Or with which to work with.) It would be interesting to put flies tied with natural dubbing alongside flies tied with the synthetics, to see if they differ greatly when photographed on film sensitized to infra-red, ultraviolet, and other non-visible wave lengths; if you're about to rush into your studio and start photographing, be sure to do several shots underwater, as polarized underwater light may affect the results.

At any rate, put me down as a believer in ESP, in UFO's, in the triumph of righteousness over iniquity and in the magical properties of peacock herl, especially when it has a slight bronze tinge to it. Here's a partial list of flies tied with peacock herl taken from Joe Bates's new book about streamers and bucktails, *The Big-Fish Flies,* published this month by Alfred A. Knopf and just arrived at my desk yesterday:

Allie's Favorite, Anson Special, Atom Bomb, Aunt Ider, Ballou Special, Black Leech, Blue Devil, Brown Hackle, Campeona Streamer, Crane Prairie Streamer, Cupsuptic, Damsel, Dick's Killer, Dr. Burke, Light Edson Tiger, Family Secret, Golden Rogan, Golden Shiner, Golden Witch, Governor Aiken, Gray Ghost, Green Beauty, Green Drake, Green Ghost, Greyhound—and that's just through the G's, in the Miscellany Section.

Not surprisingly there are a number of flies in the same book which are *not* tied with peacock herl, and I'm happy to say there's no really scientific way to determine whether or not the *(Please turn the page)*

1980 Malibu Classic Sedan.

1980 CHEVY MALIBU.

More room and better mileage than Toyota Corona and Volvo 244.†

Chevy's mid-size Malibu offers the following double feature:

1. Seats and space for up to six.
2. EPA mileage estimates which surpass those of some smaller foreign cars.

Is it any wonder, then, that this crisp new generation car has been attracting such big crowds since its introduction two years ago?

No mid-size car has more room.

Malibu offers you the kind of room so many families need today.

According to the EPA, no other mid-size car beats the Malibu Sedan's interior volume of 102 cubic feet.

Not bad for a car so trim and tidy on the outside. Not bad at all.

Better mileage estimates than these imports.

Malibu has higher EPA mileage estimates than some smaller foreign cars. (See chart.)

(20) EPA estimated MPG/26 hwy. estimate (20) 26

with 3.8 Liter (229 Cu. In.) V6. Engine not available in California—where a 231 Cu. In. V6 is standard.

Remember: Compare the circled estimated MPG to that of other cars. You may get different mileage depending on speed, trip length and weather. Your actual highway mileage will probably be less than the estimated fuel economy.

(Malibu is equipped with GM-built engines produced by various divisions. See your dealer for details.)

	Pass.	Interior	Trunk	EPA est. MPG
CHEVY MALIBU	6	102 cu. ft.	16.6 cu. ft.	20
TOYOTA CORONA† 4-door	5	80 cu. ft.	11 cu. ft.	18
VOLVO 244† 4-door	5	89 cu. ft.	14 cu. ft.	18

† Comparisons based on 1979 Toyota and Volvo.

Malibu value. It runs deep.

When you buy or lease a 1980 Malibu, you get a whole lot of car for the money.

A quick inventory:

Good gas mileage, room for up to six, big 16.6-cu.-ft. trunk, new 3.8 Liter (229 Cu. In.) V6 engine, 231 Cu. In. V6 standard in Calif., Body by Fisher, full-frame construction, radial ply tires, power front disc brakes, Full Coil suspension, front stabilizer bar, High Energy Ignition, Delco Freedom battery, full carpeting, sound-absorbing ceiling, extensive anti-corrosion treatments, protective inner fenders, long recommended service intervals.

You get a smooth and quiet ride.

Impressive handling.

Vigorous V6 performance.

Crisp, contemporary styling.

And a whole lot of pleasure every mile you drive.

America's favorite mid-size sedan.

America knows a great buy when it sees one. That's why Malibu is the best-selling mid-size sedan in the country. Also available as a sporty 2-door coupe and a spacious station wagon. At your Chevrolet dealer's now.

A fresh new slice of apple pie. Chevrolet

herl-tied flies are superior fish-getters, or whether the herl-less patterns would be more effective if some herl were to be added. Incidentally, the new Bates book is one every serious fly-tyer will want to have, not only for its reference value but for the wealth of background information on many patterns and their originators.

LAST June I attended the Outdoor Writers Association conference in Albuquerque, and having heard hackle-raising stories from Jack Samson, a part-time New Mexican, about the monster brown trout in the upper Rio Grande, I arranged with Doyle Kline, FIELD & STREAM'S field (& stream) editor for that region, to spend several days with him, fishing the Rio Grande and other rivers in northern New Mexico. To one who, like myself, had been familiar only with the southern part of that state, the mountainous and heavily forested northern area, above Santa Fe and along the Sangre De Christo range, is a surprise, and a delightful one.

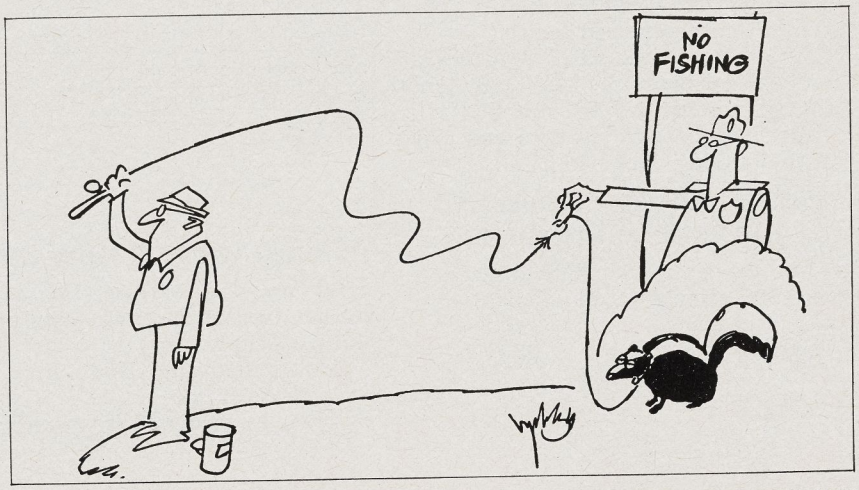
Doyle, a congenial, woods-wise writer and photographer who lives in Santa Fe but is moving to a smaller town farther north (Chama, pop. 900) to escape the hurly-burly of the city, had arranged for us to spend a couple of days in the Angel Fire Ski District, a few miles south of Taos, at the plush and pleasant Angel Fire Resort, and to fan out from there to fishing in the gorge section of the Rio Grande and some nearby mountain lakes. Unfortunately, there had been an unusually heavy snowfall in the mountains last winter, which was running off when we arrived, and both the Rio Grande and the Cimarron were too high and discolored for fly fishing, so that I was obliged to spend two days hacking my way around the resort's nifty 18-hole golf course, and taking a balloon ride across a small mountain.

Ballooning, it appears, is the "in" thing (which in English means *dernier cri*) in that part of the country, especially since a brace of New Mexicans ballooned across the Atlantic recently, and there was a group of young, cheerful balloonists staying at the resort. When John McGuire invited me one evening to be a passenger on his hot-aircraft the next morning, I turned up in time to watch the big bag being inflated with a sort of overgrown blow torch, then hopped into the basket with John and was gently but firmly wafted over a small mountain ridge until John set the contraption down on a clearing near enough to a logging road that the Jeep following us could get in to haul out the deflated bag and paraphernalia. It was the first time I had ever been wafted anywhere, and I highly recommend it as a mode of travel: no potholes, no billboards, no toll booths, no speed traps, no detours, no traffic jams, no gas station lines, no flat tires. It's the wave, or waft, of the future.

(The name "Angel Fire," incidentally, is purported to derive from a peculiar light condition sometimes seen in winter as the sun sets behind the snow-covered peaks; I thought you might be wondering, as I did.)

Another pleasant interlude on this trip was to run into Bill Huey, an auld acquaintance recently appointed head of the Natural Resources Department of New Mexico, and to see, at his Santa Fe home, one of the handsomest collections of duck, goose, and shorebird decoys I've ever come across; it seemed an odd part of the world, far from saltwater or marshland, in which to be admiring the work of Ira Hudson, Harry Shourds, and other legendary eastern seaboard carvers.

AND SPEAKING of collectors, one of the highlights of the OWAA conference was a show of antique, or at least respectably elderly, fishing lures presented by Clyde Arthur Harbin of Memphis, who had more than 3,000 lures, mostly vintage wooden plugs, on display. When I asked him about the old Creek Chub Plunker, my favorite bigmouth bass lure some forty years ago, when I did a lot of plug-chucking in southern New Jersey, he assured me it was a not-too-rare item (and to prove it, sent me a brace of them when he got back home; they brought pleasant memories, and I look forward to flinging them at some 1980-model largemouths). Clyde speaks at fishing club dinners frequently, lugging a portable display of lures.



attention of re 2

READERS RESPOND

Wooden Posts Save Hummers

I, too, would be upset if I found seven dead hummingbirds along my electric fence. However, I use wooden posts so that won't happen.

For a hummer to get electrocuted, it would have to touch the hot wire and the metal post at the same time—to complete the electric circuit. One can purchase black insulators instead of red, but that really doesn't take care of the problem. The only solution I've found is to use wooden posts instead of metal.—*John L. Delano; Helena, Mont.*

* * * * *

I am taking advantage of your invitation for readers of *Montana Outdoors* to comment on the problem of hummingbirds being electrocuted when they mistake red insulators on electric fences for bright flowers. The problem was first reported in 1983 by James W. Wilson, an ornithologist with the Missouri Department of Conservation (MDOC). At the time, Mr. Wilson reported that, "Almost all the fences we checked with red insulators on them had dead hummingbirds underneath them last fall." Mr. Wilson's inquiries to other game departments produced reports of similar incidents from biologists in three states.

According to Mr. Wilson, the problem is associated particularly with the "Red Snap'r" insulator manufactured by North Central Plastics of Ellendale, Minn. There was no evidence that red insulators manufactured by other companies pose a hazard to hummingbirds.

The Wildlife Division of the MDOC has taken the lead in publicizing the danger to hummingbirds and trying to find a solution. For up-to-date information on the status of this effort, your readers could phone them at 314/751-4115.

The Humane Society of the United States (HSUS) has cooperated with the MDOC in trying to protect hummingbirds from electrocution. We would be pleased to join with the Department of Fish, Wildlife and Parks in alerting Montana residents to this threat to hummingbirds. For example, if you publish an article or develop a poster on this topic, I would be happy to route copies to local humane societies and animal control agencies in Montana.

I hope the information provided by the HSUS will assist your readers in investigating this danger to hummingbirds.—*Guy R. Hodge, director, Data and Information Services, The Humane Society of the United States; Washington, D.C.*

Cedar Remembered

I subscribe to *Montana Outdoors* and I was surprised when I saw the painting by Shirley Johnson of my pet wolf, Cedar, on the back cover of your Sept./Oct. issue.

I lived in Alberton, Mont., during the 1970s and early '80s. I got Cedar about 1978 when he was 6 months old, from a man who found him incorrigible. I thought I could train him to be a guard "dog" for the saloon I owned at the time. I learned, as he advanced in age, that wolves are better left to the wild. After trying unsuccessfully to give him to several zoos in the "lower 48," I gave him to a man who purportedly took him to a ranch in Canada.

I now live in Alaska and work as a commercial fisherman. I live and work around a lot of wildlife and occasionally see wolves and think of Cedar. He was a pretty animal, and Mrs. Johnson did a beautiful job of immortalizing him when she did the painting. Thanks for publishing it—it made my day!—*Joe Harlan; Kodiak, Alaska*

The Wolf At My Door

by Rand Robbin

It was a new canvas, heavy and starched, smelling direct from the box, smelling a lot like the cab of Dad's new pickup. The date was March 3, 1942. The tarp was right off the shelf and barely covered the black wolf stretched dead stiff in the rear of the green Chevy half-ton.

It must have provided strange winter theater as my father drove to Kalispell in the snow, propped the wolf up for sidewalk display on Main Street, then hauled the body to Woodland Park in the company of his brother George, and two friends, Victor Sundelius and Curtis Lindsay, a game warden. They bound the rear feet with rope, heel-strung the huge animal from a cottonwood as if he were a member of the Plummer gang, and got out the Kodak. In turn, the men posed, pointed, and smiled for the camera, then cut the beast down and spread him across the hood for more. This was a final act of the drama that had begun the day before.

To some viewers, the photos would become little more than conversation pieces reproduced as post cards advertising Bigfork, a little spot in northwestern Montana on the east shore of Flathead Lake. In me, however, the pictures trigger vivid memories, jolt my consciousness, and demonstrate how quickly time consumes us. My father is gone now, as are his three companions—all dead, dead as the wolf. The snapshots illustrate the death of a majestic predator that some saw as a victory over Nature, but that others see as a travesty against Nature.

The photos do something more: They confirm my suspicion that Bigfork and other small towns which grow and change quickly were special places in which to be a boy. Such villages and their unsettled zest provided a Tom Sawyer existence impossible to resurrect.

My involvement with the wolf began the morning of March 2, a day my child's mind turned into one brimming with peril and risk.

The front entrance to Robbin General Store was one of those big, heavy, larch doors, plated almost solidly with glass from top to bottom. When you shut it, the thing emitted a real thud, followed by the faint rattle of glass. When it opened, it had its own sound, too—sort of a clicking noise with a squeak.

My memory of the wolf began with the opening of that door, followed by my father's labored rush to roll the thundering old platform scale from the back room and park it at the store's mouth. At that instant, my throat tightened—his daily pattern had changed, something important was about to happen, he knew something I didn't. Four years old and three feet tall, I stood midway down the south wall in familiar territory, behind the candy counter. The case was lined with old-fashioned jars of Tootsie Rolls and horehound. There were Black Cow suckers and lemon drops, taffy kisses, and wrapped caramels, light and dark. Unable to see over the top, it was like peering through four windows at once. From the front, my eyes must have looked like those of a giant staring through a magnifier.

"Dad, what are you doing?" I asked.

"We're going to bring a big wolf in here," he replied.

I knew well the tale of Little Red Riding Hood, the reputation of wolves, and their hunger for children. I was thunderstruck. I didn't knew whether to flee or stick around and be eaten alive. It was one of those moments that come to us all, when we first become aware of jeopardy to our very existence, our vulnerability, our fragile grip on life. It was my first panic attack, and I can still feel the pounding of my heart and the throb of blood coursing through veins too small to allow it to travel wherever it was going as fast as it wanted to get there. At that point, my father vanished out the door, and, although I didn't run (if indeed I could have made my feet move), I retreated to a safer distance and prepared for my confrontation with the wolf.

It wasn't long until my father and two other men appeared carrying a huge animal with profuse, dark, shaggy hair. A crowd was gathering, and as the wolf was flopped onto the platform of the scale, I remember it rolling out in all directions with the legs pointed north, toward O'Brien's Hotel. Too large for this new bed, it looked grotesque as it lay there, silent and unmoving, yet unwilling to relinquish its menace even in death.

As the crowd began to speak in alternating rushes of chatter and silence, I slowly moved in and gave the thing a couple of tentative pokes with the tip of my shoe. My fear gave way to conquest, as those nearby began speculating about the critter's heritage. One man called it a police dog-wolf cross. Another thought it was part wolverine, and someone claimed to know the progeny of a bear-wolf combination when he saw it. Given the drama of the moment, there is little wonder such fantasies would surface. Let it be said the animal had been dead for a while before its discovery by two men near Weed's

Making light

Kenneth Robson examines the judgments of Kingsmill Moore and his belief in three mystery colours

THEODORE CONYNGHAM Kingsmill Moore combined 70 years' experience of 32 Irish lakes and 36 rivers with the analytical mind and perception of a judge of the Irish Supreme Court. His literary talent had been confined to a legal treatise, *The Landlord and Tenant Act 1931-32*, but in 1960 at the age of 67 he produced *A Man May Fish*. It is a minor classic. This absorbing record of his fishing life is a continual quest for improvement and experiment in method and fly design from which everyone may learn. His loving observation of the wild places of Ireland and of the people he met in his wanderings enlarges our conception of life itself.

Kingsmill Moore went to school in England at Marlborough. Its well-stocked library offered him the fishing classics like Sir Edward Grey's *Fly Fishing* and though he was not allowed to fish the River Kennet, which was only 400 yards away, he spent many hours at the waterside studying the creatures it contained. Later, he was a brilliant scholar at Trinity College, Dublin where he took a degree in legal and political science, spent two war years in the Royal Flying Corps before following a long and distinguished legal career which took him to the highest office.

He kept detailed records of his fishing, so that all his observations on brown trout and sea-trout are supported by factual evidence. Sadly, his meticulously kept records of 25 years of fishing the River Slaney for salmon were swept away, together with bridges standing since the eighteenth century, in a great flood.

Kingsmill Moore was particularly interested in colour and the effect of light on fishing. He believed there were three mystery colours — claret, gentian blue and bright orange — which did not occur to any great extent in natural food yet which seemed to attract fish. His observation that the limited occurrence of orange in nature bears no resemblance to its popularity in artificials has been echoed many times since by the likes of Richard Walker and Bob Church.

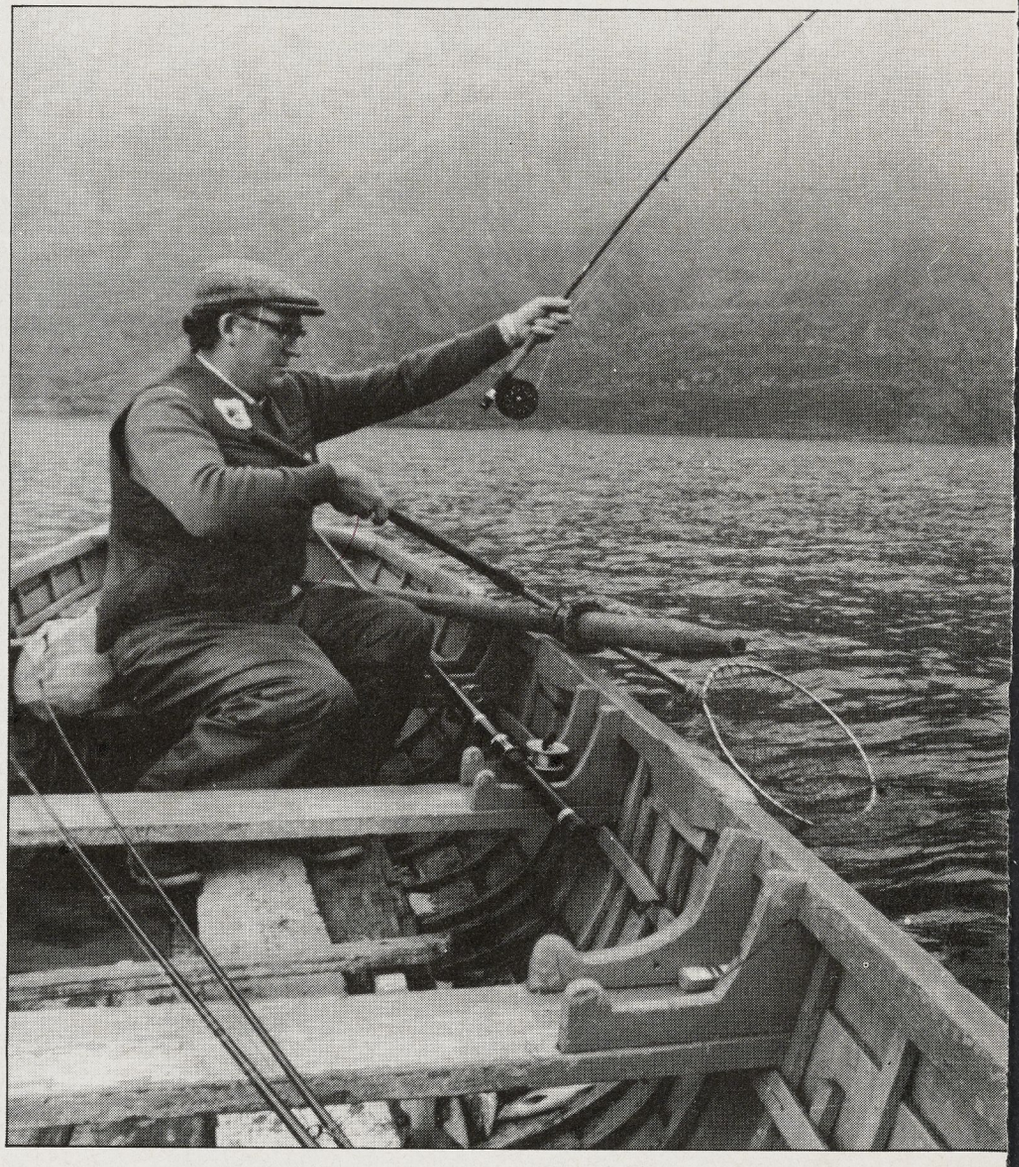
Whether trout see colour in the way we do has always fascinated anglers. Kingsmill Moore put forward a theory that infra-red rays invisible to the human eye may have a visible colour to trout. He experimented with various black body materials such as black quill, seal's fur, black silk and cotton, black ostrich herl, and concluded that black silk and black ostrich herl were the best fish-catchers. Not all black materials absorb infra-red rays, some reflect them, so he retied all his bodies on plain hooks and had them photographed on plates sensitive to infra-red rays and by a light rich in infra-red.

Only black silk and black ostrich herl came out as true blacks, the others being various shades of grey. He postulated that if a trout's vision comprised infra-red and, if, for instance, a black beetle did *not* reflect infra-red only his two successful blacks would be taken for the beetle. Black ostrich herl thus became one of his favourite body materials, and he used it for his fly, the Kingsmill.

He repeated his experiment with various colours and tentatively concluded that if trout can see an infra-red colour and if natural flies reflect infra-red to any degree then they would not appear to the trout in the colour that we see them. This might explain some of the success of patterns which to our eyes are not near the colour of the natural they represent.

Kingsmill Moore also thought that there were three mystery materials which especially appealed to fish — hare's ear, blue jay and black ostrich herl. He noticed that old Irish fly-dressers often used black ostrich herl to butt the tail and the head of their flies.

Twenty-five years on, with the benefit of Professor Muntz's experiments mentioned by Brian Clarke and John Goddard showing that not only can trout be trained to respond to different colours, but can distinguish different shades of the same colour, we may tend to regard Kingsmill Moore's theories as touched with Irish blarney. However, his



Ambassadeur V.Mag XL Plus	86.50	**72.95**	13.75	**11.70**
Ambassadeur 5600 Plus	59.95	**49.50**	9.25	**7.90**
Ambassadeur 4600 Plus	59.95	**49.50**	9.25	**7.90**
Ambassadeur 6600FL	69.95	**59.45**	9.95	**8.45**
Ambassadeur 6500GR	69.95	**59.45**	9.95	**8.45**
Ambassadeur 5600FL	65.95	**55.99**	9.95	**8.45**
Ambassadeur 6000	59.95	**50.95**	9.95	**8.45**

LIMITED QUANTITY

Ambassadeur 2500C	93.50	**84.99**	13.95	**11.00**
Ambassadeur 5001C L.H.	86.95	**78.99**	13.95	**11.00**

DAIWA

Millionaire 6HM	64.99	**55.25**	11.50	**9.80**
Millionaire 6RM	59.99	**50.99**	11.50	**9.80**
Magforce PMF55H	81.99	**69.70**	12.00	**10.20**
Magforce PMF57H	84.99	**72.25**	12.50	**10.65**

PENN

Levelmatic 930	86.50	**65.99**	12.00	**10.20**
Levelmatic 940	89.50	**69.99**	12.00	**10.20**

FIXED SPOOL REELS

ABU

754	31.95	**26.35**	5.95	**5.05**
755	34.95	**28.99**	5.95	**5.05**
757	37.95	**32.25**	7.85	**6.65**
754FC	33.95	**28.85**	5.95	**5.05**
5	44.95	**38.20**	5.95	**5.05**
4	42.95	**36.50**	5.95	**5.05**
964FC	36.95	**31.40**	5.95	**5.05**
157 (ORIGINAL)	45.99	**39.95**	5.95	**5.05**

DAIWA

GS2050	39.99	**33.99**	7.00	**5.95**
GS4050	47.99	**40.80**	8.00	**6.80**
SS800RDA	44.99	**38.25**	6.00	**5.10**
SS900RDA	46.99	**39.90**	7.00	**5.95**

MITCHELL

4450z	38.00	**27.15**	6.95	**5.55**
2250RD	37.50	**27.99**	7.50	**6.00**
3550FC	49.95	**37.50**	7.50	**6.00**
300/301 "PRO"	52.50	**39.50**	7.50	**6.00**
300/301	32.50	**24.40**	5.95	**4.75**
410/411	35.50	**26.65**	5.95	**4.75**
300s/301s	35.50	**26.65**	7.50	**6.00**
810/811	32.95	**24.95**	5.95	**4.75**
306a/307a	34.60	**25.95**	6.75	**5.40**

FLY LINES

BOB CHURCH FLY LINES

Canadian (lead impregnated) V.F.S. (dark green) WF 7, 8, 9 or DT 8, 9, 10	19.40	**16.50**
ST 7, 8, 9, 10	10.35	**8.80**
Arthur Cove "Nymph" special floating DT 5, 6, 7, 8, 9 or WF6, 7, 8, 9	15.09	**12.83**
New Canadian slow/medium sinker (med. brown) WF 7, 8, 9 or DT 7, 8, 9	10.78	**9.16**
Lead cored trolling line 45lb	12.95	**11.00**

HARDY FLY LINES

'NEW' GOLDEN DE-LUXE FLYLINES

	TERMS	CASH
WF 5-6-7-8-9-10 Floating	28.95	**24.60**

DELUXE FLY LINES

DT 4-5-6-7-8-9 Floating	23.15	**19.65**
DT 10-11-12 (40yds) Floating	31.95	**27.15**
WF 5-6-7-8-9-10 Floating	23.15	**19.65**

DRY FLY RANGE FLOATING

DT 2, 3, 3½, 4, 5, 6, 7, 8, 9, 10, 11, 12	19.25	**16.35**
WF 3, 4, 5, 6, 7, 8, 9, 10	19.25	**16.35**
ST 7, 8, 9, 10	11.85	**10.05**
Long Belly WF 5-6-7-8	24.95	**21.20**

SINK TIP RANGE

DT 6-7-8-9-10 F/S	22.95	**19.50**
WF 6-7-8-9-10 F/S	22.95	**19.50**

WET FLY RANGE

No. 1 DT 5-6-7-8-9-10 "Slowsink"	19.25	**16.35**
No. 1 WF 5-6-7-8-9-10 "Slowsink"	19.25	**16.35**
No. 1 ST 7-8-9-10 "Slowsink"	11.55	**9.80**
No. 2 DT 5-6-7-8-9-10-11-12 "Fast sink"	19.25	**16.35**
No. 2 DT 10-11-12 (40yds) "Fast sink"	24.95	**21.20**
No. 2 WF 5-6-7-8-9-10-11 "Fast sink"	19.25	**16.35**
No. 2 ST 7-8-9-10 "Fast sink"	11.55	**9.80**
No. 3 DT 7-8-9-10 "Fast sink" "extra"	19.25	**16.35**
No. 3 WF 6-7-8-9-10 "Extra Fast sink"	19.25	**16.35**
No. 3 ST 7-8-9-10 "Extra Fast sink"	11.55	**9.80**

CORTLAND FLY LINES (444)

Peach (AT3F-DTF12F) (WF4F-11F)	29.00	**24.65**
Peach Shooting Taper (ST6F-ST11F)	15.65	**13.30**
Gloline Red (DT5F-DT9F) (WF5F-WF9F)	29.00	**24.65**
Nymph Tip (WF4F-WF9F)	29.50	**25.07**
Peach/Brown (WF5F/S-WF11F/S) Sink Tip	29.50	**25.07**
Peach/Green (WF5F/S-WF9F/S) Slow Sink Tip	29.50	**25.07**
Peach/Brown (DT5F/S-DT10F/S) Sink Tip	29.50	**25.07**
Brown (DT5S-DT11S) Slow Sink	29.00	**24.65**
Brown (DT5S-DT9S) Fast Sink	29.00	**24.65**
Brown (DT6S-DT12S) Extra Fast Sink	29.00	**24.65**
Brown (WF6S-WF11S) Med/Slow Sink	29.00	**24.65**
Brown (WF5S-WF11S) Fast Sink	29.00	**24.65**
Brown (WF5S-WF11S) Extra Fast Sink	29.00	**24.65**
Brown (ST8S-ST11S) Medium Sink	15.65	**13.30**
Brown (ST6S-ST11S) Fast Sink	15.65	**13.30**
Brown (ST6S-ST11S) Extra Fast Sink	15.65	**13.30**
Brown (ST9S-ST12S) Super Sink	15.65	**13.30**
FL Green (DT5F-9F) (WF5F-10F) S.L.	29.99	**25.49**
Blue (WF5I-WF10I) Intermediate	29.00	**24.65**

SCIENTIFIC ANGLERS AIRCEL AND WETCEL LINES AIRCEL RANGE ULTRA HIGH FLOATING

	TERMS	CASH
DT 5-6-7-8-9-10 or WF 6-7-8-9-10F	29.95	**23.95**

AIRCEL SUPREME FLOATING IVORY "OR" MAHONGANY

	TERMS	CASH
DT 4-5-6-7-8-9-10-11F	22.95	**18.35**
WF 5-6-7-8-9-10F	22.95	**18.35**

STANDARD (GREEN) FLOATING

	TERMS	CASH
DT 5-6-7-8-9 WF 6-7-8-9F	18.95	**15.15**
(WHITE) ST 6-7-8-9-10F	12.95	**10.35**

WET TIP (TWO TONE GREEN) SINK TIP

	TERMS	CASH
WF 6-7-8-9-10F/S	22.50	**17.99**
DT 6-7-8-9-10-11-12 F/S	22.50	**17.99**

WETCEL RANGE INTERMEDIATE (KELLY GREEN)

	TERMS	CASH
DT 6-7-8-9-10 WF 6-7-8-9-10	20.95	**16.75**

WETCEL I SLOW SINK

	TERMS	CASH
DT 6-7-8-9-10	20.95	**16.75**
WF 6-7-8-9-10-11	20.95	**16.75**
ST 8-9-10	12.50	**9.99**

WETCEL II FAST SINK

	TERMS	CASH
DT 6-7-8-9-10-11-12	20.95	**16.75**
WF 6-7-8-9-10-11-12	20.95	**16.75**
ST 6-7-8-9-10	12.50	**9.99**

WETCEL HI SPEED HI-D (GREY)

	TERMS	CASH
WF 6-7-8-9-10-11-12-13-14-15 "SUPERFAST"	26.50	**21.20**
ST 7-8-9-10-11 "SUPERFAST"	15.50	**12.40**

"DUE TO AN OVERWHELMING DEMAND" THERE HERE! THE "DEEP WATER EXPRESS" VERY FAST SINKING LINE

	TERMS	CASH
550 Grain	21.95	**17.80**
700 Grain	21.95	**17.80**

SHARPES OF ABERDEEN (NETS) MADE IN SCOTLAND BY PRECISION ENGINEERS AND CRAFTSMEN

All updated 86" Versions

ABBREVIATIONS — F.H. Fixed handle 'Trout Seatrout' T.H. — Telescopic handle

		TERMS	CASH
8	"ESK" Trout (F.H.)	11.85	**10.10**
8A	"ESK" Trout (T.H.)	17.15	**14.60**
8B	"ESK" Seatrout (F.H.)	12.65	**10.75**
8C	"ESK" Seatrout (T.H.)	17.95	**15.30**
11	"VIKING" Trout (F.H.)	20.50	**17.45**
11A	"VIKING" Trout (T.H.)	25.55	**21.75**
11B	"VIKING" Seatrout (F.H.)	22.15	**18.85**
11C	"VIKING" Seatrout (T.H.)	27.50	**23.40**
41	"SEAFORTH" Trout (F.H.)	14.35	**12.20**
41A	"SEAFORTH" Trout (T.H.)	19.35	**16.45**
3	"ERROL" Trout (F.H.)	14.35	**12.20**
3A	"ERROL" Trout (T.H.)	19.35	**16.45**
5	"BELMONT" Trout (F.H.)	14.35	**12.20**
5A	"BELMONT" Trout (T.H.)	19.35	**16.45**
41B	"SEAFORTH" Seatrout (F.H.)	15.95	**13.55**
3B	"ERROL" Seatrout (F.H.)	15.95	**13.55**
5B	"BELMONT" Seatrout (F.H.)	15.95	**13.55**
41C	"SEAFORTH" Seatrout (T.H.)	21.40	**18.20**
3C	"ERROL" Seatrout (T.H.)	21.40	**18.20**
5C	"BELMONT" Seatrout (T.H.)	21.40	**18.20**

SALMON NETS

		TERMS	CASH
15	"GILLIE" Salmon	40.95	**34.85**
25	"GILLIE" Seatrout	37.60	**31.95**
17	"GYE" Salmon	39.60	**33.65**
18	"GYE" Seatrout	37.50	**31.85**
4	"GORDON" Salmon	56.50	**47.99**
16	"TAY" Salmon	32.85	**27.95**
90	"GYE" Netsling	6.95	**5.95**

SHARPES ACCESSORIES

		TERMS	CASH
9	"SALMON PRIEST"	5.99	**5.10**
9A	"TROUT PRIEST"	3.99	**3.45**
10	"SALTWATER PRIEST"	11.99	**10.20**
12	"DON" Telescopic gaff	19.95	**16.95**
24	"DEE" Telescopic gaff	27.15	**22.99**
19	"SHORE" Tailer	23.85	**20.30**
21	"SEAFORTH" Wading staff	18.25	**15.50**
22	"SPEY" Wading staff	22.75	**19.35**
20	"SCREW IN" Tailer	11.50	**9.85**
26	"SCREW IN" Gaff with protector	9.99	**8.50**
27	"GAFF" point protector	8.99	**7.65**
80	"SHOULDER & WAIST" Belt	6.95	**5.95**

SHARPES BALL BEARING SWIVELS

1 pkt of 3 = £1.30, 50 = £19.80, 100 = £36.99.

"MASTERLINE REVOLUTIONS" FLOATING (SAND)

	TERMS	CASH
(DT4F-DT9F) (WF5F-WF9F)	17.55	**15.95**
(DT10F-DT11F) (WF10F)	19.75	**17.95**

NEUTRAL DENSITY (CHESTNUT)

	TERMS	CASH
(DT4N-DT9N) (WF5N-WF9N)	17.55	**15.95**
(DT10N-DT11N) (WF10N-WF11N)	19.75	**17.95**

MEDIUM SINKING (GREEN)

	TERMS	CASH
(DT5S-DT9S) (WF6S-WF9S)	17.55	**15.95**
(DT10S-DT11S) WF10S-WF11S)	19.75	**17.95**

ULTRA FAST SINKING (BLACK)

	TERMS	CASH
(DT7UFS-DT9UFS) (WF7UFS-WF9UFS)	17.55	**15.95**
(DT10UFS-DT11UFS) (WF10UFS-WF11UFS)	19.75	**17.95**
(DT13/15UFS) (WF13/15UFS)	21.95	**19.95**

SINK TIP (SAND/BROWN TIP)

	TERMS	CASH
(DT6SF-DT9SF)	21.95	**19.95**
(DT10SF-DT11SF)	27.45	**24.95**

SUPER SPORTSMAN FULL LENGTH FLYLINE WITH BACKING

	TERMS	CASH
(DT5F-DT9F) (WF6F-WF9F)	11.20	**9.75**
(DT5S-DT9S) (WF6S-WF9S)	11.20	**9.75**

"NEW SHAKESPEARE FLY LINE" "THE WORCESTERSHIRE FLY" FLOATING (NATURAL)

	TERMS	CASH
(DT5F-DT11F) (WF5F-WF11F)	17.99	**15.30**

SINKING (DK. GREEN)

	TERMS	CASH
(DT5S-DT11S) (WF5S-WF11S)	17.99	**15.30**

FAST SINKING (DK. BROWN)

	TERMS	CASH
(DT5FS-DT11FS) (WF5FS-WF11FS)	17.99	**15.30**

SINK TIP (NATURAL/DARK GREEN TIP)

	TERMS	CASH
(DT6ST-DT11ST) (WF6ST-WF11ST)	18.99	**16.15**

KAMATSU FLY & SALMON HOOKS ALL NEW PATTERNS FOR 1986! LAST YEAR'S BEST SELLER!

B160	(Sizes 6-14)	**£1.30 per 25**
B170	(Sizes 6-16)	**£1.30 per 25**
B175	(Sizes 6-14)	**£1.30 per 25**
B400	(Sizes 8-16)	**£1.30 per 25**
B405	(Sizes 8-18)	**£1.30 per 25**
B440	(Sizes 8-16)	**£1.30 per 25**
B800	(Sizes 4-14)	**£1.50 per 25**
B810	(Sizes 4-14)	**£1.50 per 25**
B820	(Sizes 4-12)	**£1.50 per 25**
B830	(Sizes 6-14)	**£1.50 per 25**
B270	(Sizes 6-14)	**£2.40 per 10**
B180	(Sizes 4-12)	**£1.85 per 25**
B990	(Sizes 2-12)	**£2.40 per 10**
B280	(Sizes 4-12)	**£2.75 per 10**
B380	(Sizes 8-16)	**£3.40 per 10**

MUSTADS IN 50s

9143 6-8-10-12-14-16 — **£1.10.** 3904A 8-10-12-14-16 — **£1.70.** 94840 — 8-10-12-14-16 — **£1.65.** 3913B — 12-14-16 — **£1.70.** 79580 — 6-8-10-12 — **£2.05.** 94845 (barbless) — 10-12-14-16 — **£1.90.**

OPTIX CORMORANTS POLARISED SUNGLASSES UNDOUBTEDLY THE BEST! OPTIX CORMORANTS "ORIGINALS"

	TERMS	CASH
Q702 Grey lenses Q703 Amber lenses	16.99	**14.40**

OPTIX FLIP-CLIP

	TERMS	CASH
Q704 Grey lenses Q705 Amber lenses	16.99	**14.40**

OPTIX CORMORANTS "UNBREAKABLE FRAMES" TORTOISESHELL FRAMES

	TERMS	CASH
Q706 Grey lenses Q707 Amber lenses	20.50	**17.40**

BLACK FRAMES

	TERMS	CASH
Q708 Grey lenses Q709 Amber lenses	20.50	**17.40**

H.L.T. HIGHLIGHT TRANSMISSION TORTOISESHELL FRAMES

	TERMS	CASH
Q698 Grey lenses Q699 Amber lenses	24.95	**21.20**

MATT BLACK FRAMES

	TERMS	CASH
Q696 Grey lenses Q697 Amber lenses	24.95	**21.20**

ECONOMY OPTIX NEUTRAL GREY LENSES

5.75 **4.99**

MONOFILAMENT

ABU TEST — 4lb (4000m) 8lb (1600m) 12lb (1060m) 16lb (700m) 20lb (600m) 25lb (550m) 30lb (500m).

TERMS £5.45 **CASH £4.95**

BERKLEY TRILENE — AMERICA'S NO. 1. MONOFILAMENT XL — EXTRA LIMP FOR CASTING

B/S	100m	275yds	1000yds
3lb	**2.20**	**4.45**	**12.55**
4lb	**2.35**	**4.70**	**13.25**
5lb	**2.50**	**4.95**	**14.15**
6.5lb	**2.60**	**5.20**	**14.65**
8lb	**2.75**	**5.45**	**15.55**
10lb	**2.90**	**5.70**	**16.25**
12.5lb	**3.05**	**5.95**	**17.15**
15lb	**3.10**	**6.20**	**17.65**
18lb	**3.30**	**6.45**	**18.70**
22lb	**3.50**	**6.70**	**19.60**
27lb	**3.70**	**6.95**	**21.00**
32lb	**4.05**	**7.20**	**22.75**

MAXIMA 600m (660yds)

3lb — **£5.35,** 4lb — **£5.40,** 5lb — **£5.95,** 6lb — **£6.00,** 8lb — **£6.25,** 10lb — **£6.50,** 12lb — **£6.95,** 15lb — **£7.50,** 18lb — **£7.75,** 20lb — **£7.90,** 25lb — **£8.50,** 30lb — **£9.20.**

STREN MONOFILAMENT AVAILABLE IN GOLD OR CLEAR BLUE

100m — 2lb, 4lb, 6lb, 8lb — **£2.20;** 10lb, 12lb, 14lb, 17lb — **£2.90;** 20lb, 25lb, 30lb — **£3.55.**

250yds — 2lb, 4lb, 6lb, 8lb — **£4.70;** 10lb, 12lb, 14lb, 17lb — **£6.15;** 20lb, 25lb, 30lb — **£7.55.**

600yds — 2lb, 4lb, 6lb, 8lb — **£10.50;** 10lb, 12lb, 14lb, 17lb — **£12.55;** 20lb, 25lb, 30lb, 40lb — **£16.75.**

ACCESSORIES BOB CHURCH

Black Streak flat nylon (30lb — 100yds)	**£4.74**
Hollow braided nylon backing (75metres)	**£4.74**
"Breeze" blow line for dapping (40yds)	**£2.25**
Hollow braided floating casts — leaders	**£3.97 each**
Hollow braided sinking casts — leaders	**£3.97 each**
Line tray	**£11.65**
Boat drogue	**£11.65**
Maxi drogue	**£11.99**
"New" trout bass bag	**£2.95**
Ethafoam (1m × 1ft)	**£1.35**
"New" extending boat seat	**£49.95**
"New" giant tackle bag	**£15.50**
De-luxe tackle bag	**£12.60**
Boat cushion seat	**£3.95**
Brass priest	**£4.99**
One piece marrow spoon/priest	**£6.99**
Marrow spoon/combination priest	**£11.40**
Marrow spoon	**£6.50**
Fly wallet (175 patts)	**£4.35**
Fly wallet (300 patts)	**£4.99**
De-luxe salmon wallet	**£5.65**
Leather fly wallet (small)	**£5.95**
(Large)	**£6.95**
Suede pokey bag	**£3.40**

HARDY

Reel cases (vinyl) small — **£2.35,** Med — **£2.60,** Large — **£2.75,** Extra large — **£3.00**

	TERMS	CASH
Reel cases (leather) small	£15.00	**£12.75**
Medium	£16.50	**£14.00**
Large	£17.95	**£15.25**
Rod cases — Smuggler fly	£39.65	**£33.70**
Smuggler spin	£45.75	**£38.90**
Bags — (Trout Fisher)	£45.45	**£38.65**
(Test)	£37.95	**£32.25**
(Brook)	£21.45	**£18.25**
(Carryall)	£40.85	**£34.75**
(Compact)	£38.45	**£32.70**
(Aln)	£25.30	**£21.50**
Nets — Favourite Trout Fishers	£30.15	**£25.65**
Favourite Knotless	£30.15	**£25.65**
Superlite	£46.50	**£39.55**
Atlas	£42.70	**£36.30**

MISCELLANEOUS

	TERMS	CASH
Farnborough Ext	£7.65	**£6.50**
Screw in 2"	£3.70	**£3.15**
Screw in 4"	£4.75	**£4.05**
Thermometer	£10.25	**£8.75**
Fish smoker	£29.95	**£25.45**
Smoke dust		**£1.55**
Extendable scissor keepers	£6.45	**£5.50**
Telescopic tailer	£29.95	**£25.45**
Telescopic gaff	£49.10	**£41.75**
CLOTHING		
Waxproof jacket Countrywear		
Sm, Med, Lge, Ex Lge, Ex, Ex Lge	£62.95	**£53.50**
Lining	£16.75	**£14.25**
Fly fishers vest	£26.25	**£22.30**
De-luxe fly fishers vest	£39.95	**£33.95**

NORMARK PRODUCTS

Full range of Rapala lures stocked	
Cobra flat monofilament 20lb (per 50yds)	**£3.15**
30lb (per 50yds)	**£3.80**
Micron backing 20lb (per 50yds)	**£3.80**
Gold Medallion shooting head backing 23.5lb B/S (5metres)	**£6.30**
Cortland dry fly spray	**£2.35**
Cortland dry-ur-fly	**£4.25**

Normark Adapta leaders — No 1 16lb-3lb; No. 2 18lb-5lb; No. 3 24lb-7lb **70p each or £5.95 for 10.**

MASTERLINE RYOBI

Mastermono — 2lb, 3lb, 4lb, 5lb, 6lb, 7lb, 8lb, 10lb, 15lb, 20lb (25m) any spool	**80p**
Sheppard Dispensers — holds 2 spools	**£2.50**
Holds 4 spools	**£2.99**
Trout backing (20lb) (up to 10 × 50yds)	**£2.25 each spool**
Salmon backing (30lb) (up to 10 × 75yds)	**£3.25 each spool**
Braided monobassline (up to 10 × 50yds)	**£3.50 each spool**
Black solid mono (up to 10 × 200ft)	**£2.75 each spool**
Castcarrier wallet	**£1.25**
Spare cast carriers	**£1.50 per 10**

	TERMS	CASH
Solvkroken nets — Bow net	£8.65	**£7.50**
Folding landing net	£16.05	**£13.95**
Mini	£19.50	**£16.95**
Midi	£20.15	**£17.50**
Maxi	£20.65	**£17.95**

BERKLEY PRODUCTS

	TERMS	CASH
Berkley Specialist 558 reel	£24.15	**£18.99**
Spare spool	£7.95	**£6.75**

Full range of fly tying equipment on show — Bruce and Walker Devon Minnows — Barbour clothing stocked — how to order:-

HOW TO ORDER

Everything is post free for order over £5 (under £5 please add £1 p&p).

In our experience large parcels (particularly where rods are concerned) we strongly recommend Securicor delivery — we only charge £4.00 for this faster, safer service. Smaller parcel £4.50. All the above apply to UK Mainland.

Overseas customers please note se now have the facility for sending small or large parcels virtually anywhere in the world. Please write with requirements for carriage quotations. VAT refunds also available subject to EEC regulations.

Terms customers please state your bank cheque card number on your order. When ordering by terms we require all 5 cheques, take total order value divide by 5, first cheque current and to include carriage charges (if any) when using this facility in the shop please bring identification and proof of address. All cheques and PO made out to: J. Johnson Ltd. Alternatively we accept Access, Barclaycard, BEN Charge and Privilege Card. 24 hour answering phone available.

day. He was particularly interested in the Derbyshire Bumble flies, which had no wings but a stiff cock hackle wound from shoulder to tail. No other form of tying appeared to him so translucent. The fire and sparkle of the hackles, especially the dyed ones, shifting with each movement of the fly, conveyed an illusion of active life. This movement suggested the fluttering and movement of sedges, crane flies and some of the diptera. The old term "tied buzz" seemed to him to imply that it represented a fluttering insect.

Kingsmill Moore became convinced that such flies made the best droppers, and the theory behind their success formed the basis of the patterns he invented where he tried to combine the old English form of construction with the principle of Irish colour mixing.

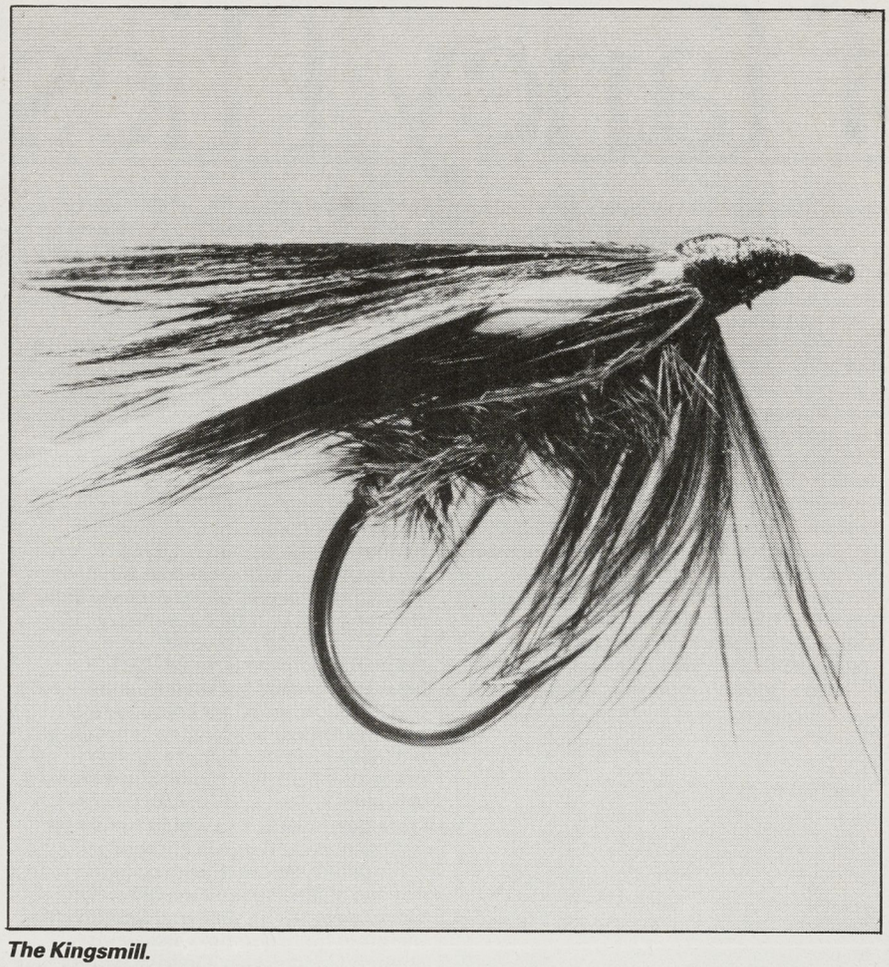
His own favourite colours were golden olive, claret (medium and dark), orange, fiery brown, dark gentian blue, grey, black and silver. Most were incorporated in either his Bumble patterns or the Kingsmill. He was much concerned about the exactness of colours in fly-dressing materials and, as a keen gardener, it occurred to him to specify them according to the Royal Horticultural Society's two-volume colour chart.

In these days when a new fly seems to be invented every five minutes, it is interesting to read Kingsmill Moore's comments which introduced his own patterns. He said that it was rash to recommend a pattern of one's own and necessary to lay down strict standards first. There were so many patterns of proven worth that a new fly must demonstrate its superiority either as an all-condition fly or in particular and recurring conditions.

In the case of the Bumble patterns Kingsmill Moore set out to design a general-purpose fly which was opalescent, with gleam but not dazzle, with gentle but not gaudy contrasts, and which would suggest the movement of insects caught in the surface film or blown along by the wind.

His first attempts at combining two colours by using a hackle at the shoulder and one halfway down, then by palmering each half of the body, were not very successful. He finally found the desired gleam and sparkle by tying in two different-coloured cock hackles at the same point and winding them along the body so that the fibres were completely commingled. The winding had to be done carefully. If too close the fly lost transparency. If too wide, the life and brilliance were lost. Jamie Donellan, his Corrib gillie, approved the colour mix but criticised the stiffness of the hackles compared with his own soft feathers. This led to the addition of a long, sparse, soft hackle from a game bird tied in at the head with longer fibres than the two stiff cock hackles. Though supported by these hackles, its longer tips were free to wave and struggle as if the creature had a movement of its own.

While his Bumbles developed from a theory, the Kingsmill evolved more from trial and error. It started with a bargain consignment of bright lake flies of which one sober specimen stood out. It had a body of black ostrich herl ribbed with silver, a black hackle and a black wing



The Kingsmill.

with a white tip. At the tail was a bunch of yellow floss. It was called Heckham Peckham and Black but, stood upright on the bend of the hook, it looked like a baby penguin with white belly and yellow feet. Its first success was on Lough Melvin in very bad weather, when it took a 3 lb gillaroo. Not until two years later did Kingsmill Moore find that in a smaller size it would work almost as well in sunny weather. He then decided to try to improve it.

Golden-pheasant topping replaced the yellow floss at the tail, and the white-tipped wing was ousted in favour of a rolled wing of rook secondary. He experimented with various body materials to replace the black ostrich herl because of its vulnerability to trout's teeth and its tendency to flatten. None proved as good and black ostrich herl had a special place in his affections anyway. The two modifications which changed the Kingsmill into an outstanding fly were, to a lesser extent, the addition of small jungle-cock cheeks to the black wing but, most markedly, the tying of a second golden-pheasant topping to lie closely over the top of the wing and intersect with the topping at the tail. Kingsmill Moore described the fly as surrounded by a halo of pale golden light. For sea-trout he added a tag in one of his special colours — blue (RHS Enamel Blue 48/1).

Kingsmill Moore theorised on whether the fly's killing qualities were because it was a lure or whether it imitated some form of natural food. He felt this might be a black beetle. He had found beetles in trout autopsies, and, when he held a beetle up to the sky and saw light creeping round the shiny wing-cases in a kind of halo, he felt the golden-pheasant topping created a similar effect. It is generally felt these days that beetles do not figure largely in the diet of lake trout and, considering the number of fish taken with the Kingsmill by its inventor and his friends, it seems more likely that it is taken as a lure. One thinks of the later success of flies like the Black Chenille and the Ace of Spades. Kingsmill Moore's method of casting a long line and retrieving either in a series of jerks or by a continuous draw of varying speed fished the fly probably as many present-day anglers do their lures.

Tying the Kingsmill

Hook: Size 8-12 Captain Hamilton or Partridge wide gape
Silk: Black
Tail: Golden-pheasant topping
Body: Black ostrich herl
Rib: Oval silver
Hackle: Best-quality black cock
Wing: Rook secondary, closely rolled so as to keep solid, and tied long, low and rather narrow.
Sides: Jungle cock or substitute, small and not too white in the enamel
Topping: A good golden-pheasant topping, taken hard up against the top edge of the wing, and long enough to intersect the topping at the tail

# of fancy flies

systematic practical comparison of English and Scottish flies with Irish ones clearly adds to our knowledge and led directly to the creation of his renowned Bumble flies.

He had a large collection of English and Scottish lake flies bought as surplus at the end of each season from W.J. Cummins. His Irish flies included some of the famous Rogan's of Ballyshannon. The contrast between them was marked. The English and Scottish were characterised by their brilliance of colour, their immaculate form — wings a sleek pad without a fibre out of place, fur wound so tightly that the tinsel ribbing did not sink in but stood out in glittering bands, bodies in shining primary and secondary colours. The Irish flies by comparsion looked dull and scruffy. Wings were ragged and often separated with strands all awry. Tinsel was barely visible, buried in the loosely spun fur, which was often picked out with a needle. There was no primary colour and only one secondary — orange. Instead, there was an array of tertiary colours in tints of autumn landscape.

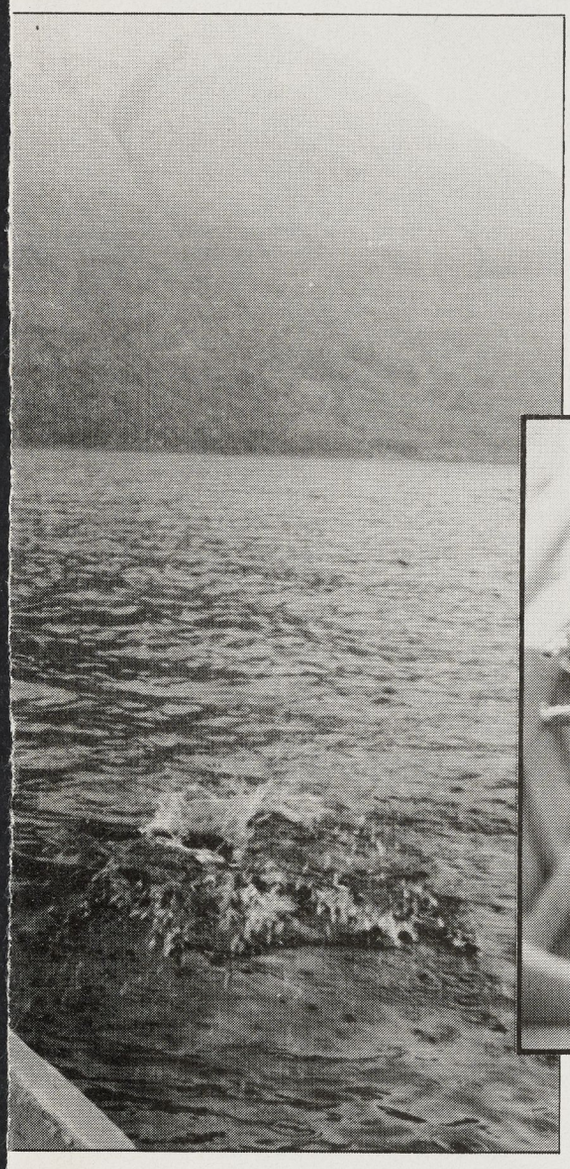
When the flies were examined against a northern light the Irish assortment came into its own. Light found its way through ragged wings, trickled in and out of gleaming seal's fur, reflected back from hidden tinsel and turned the whole body into a haze of colour. Much depended on the quality of the seal's fur. Rogan's stood out for the shine and richness of the colour. He dyed his own and kept his methods secret, but it was rumoured that part of the process used jackass urine kept till the sanitary inspector had to intervene!

The English and Scottish flies, however, because of their opaque construction, lost their colour and became almost silhouettes. It reminds one of a comment Richard Walker once made that if all the standardised Mallard, Woodcock, Teal and Grouse patterns were dyed black, you would hardly be able to tell one fly from another.

Kingsmill Moore then proceeded to test one set of flies against the other. One rod fished a cast of English and Scottish flies; the other Irish, and the casts were changed at intervals. On Irish waters Irish flies were more effective. There was not much to choose at the tail, but as droppers the only English patterns to compare were Palmers and Bumbles. Kingsmill Moore reasoned that English and Scottish flies, being opaque, looked best when seen by light reflected from them, while the Irish flies were more translucent and were at their best when light was transmitted through them. He argued that surface life is translucent and sub-surface opaque, with some exceptions. As the dropper fly is within an inch or so of the surface trout see it from underneath, and so by transmitted light, until the last moment. A trout sees the tail fly often from the side or even from above. So Kingsmill Moore plumped for opaque tail flies and translucent droppers.

He was much taken by the success of the Palmer flies as droppers, recollecting that they were used in Charles Cotton's

A Teal and Blue Bumble, one of a series of flies designed to have gleam but not dazzle.



Above: Thousands of sea-trout — in Britain and Ireland — must have fallen victim to Kingsmill Moore's patterns.

Left: A good sea-trout resists the net on Ireland's Doo Lough, a water much-fished by Kingsmill Moore.

The classy tuxedo, the stretch limo, and a wide range of productive lures have one thing in common...

BASIC BLACK

BY JIM BASHLINE

The next time you talk about lures, swing the conversation to the matter of color. Serious anglers expound many philosophies concerning lure-color effectiveness, and lure manufacturers, who are well aware of the differences of opinion, take advantage of the fact. New colors, as well as new shapes, actions, and other additives, drive the wheels of fishing equipment industries. Every time you begin to think there's nothing left to create, modify, or reintroduce, some new crop of fish-getters will prove you wrong.

Not long ago I saw a prototype of a machine which, when given the day, hour, species, temperature, wind direction, water color, and depth, would print out a series of lure selections and the suggested color for each. The technician demonstrating this angling computer told me that information on *how* to fish the lure would also be included after the programmers had digested information from a hundred or more certified experts. Wow! Are the poor fish going to be in for it!

At risk of sounding like a card-carrying stick-in-the-mud, I must point out that though this marvelous new electronic gear is fun to play with, it's still the fisherman who catches (or doesn't catch) the fish. Which brings us back to the basics: in this case, basic black.

Little of what I'm about to say applies to saltwater fishing. Though black lures will catch certain saltwater species with considerable regularity, it is the opposite of black, white, that is a top color for saltwater angling. In freshwater, however, when fishing a new spot, fishermen will find a black lure, fly, or bait is hard to beat.

My reasoning may be simplistic, but let's look at the dozens of black-colored creatures that freshwater fish regularly eat. Small eels (elvers), crickets, ants, hundreds of beetle forms, leeches, hellgrammites, crayfish, and many species of totally aquatic insects can be counted. In addition, the backs of most freshwater minnows are black, as are tadpoles and some salamanders. While there are color variations among frogs, many can be blackish on their backsides, too. When viewed from the top against a dark river or lake bottom, most minnows, crayfish, frogs, and aquatic insects are mighty hard to see unless they move. Many underwater researchers have concluded that beyond 10 feet of water depth, all colors, except the fluorescent ones, tend to darken and eventually appear as black or near black. When viewed from below, and silhouetted against the sky (day or night), lures, dry flies, and floating naturals also appear black. I've spent many waterlogged hours in swimming pools looking up at surface lures trying to distinguish color. I haven't seen any colors yet except black or dark gray.

When trying a new freshwater spot, anglers will find flies, worms, crankbaits, jigs, or any other lure clad in black hard to beat.

Photo by the author

I'm not sufficiently carried away with boosting black to suggest tossing all other lures into the bulrushes. Fish do not take all of their food from the surface or from the bottom. They catch a large percentage of it by chasing it or lying in wait, and by doing so, they have the chance to see their prey clearly. Fish do see color; I'm convinced they can see it with a subtle distinction that humans can't comprehend. But black is a most common color in nature, and I've yet to see the freshwater fish that won't respond to it.

For fifty years, the most popular smallmouth bass lures on Pennsylvania's Susquehanna River have been the Tiny Torpedo and the Jitterbug. Tackle boxes on board the airboats, canoes, and johnboats that ply this shallow, mile-wide river all contain a healthy supply of both lures—predominantly black. Further, black is the choice of knowledgeable local anglers for day or night fishing. Granted, the Jitterbug moves partly in the water instead of totally on the surface, allowing the fish to see some of the color. But what about the Torpedo? Like a number of other propeller lures, it's generally reeled in fast and only the whirling props and their wake is what the fish sees. But get this. Not a few good smallmouth anglers have drilled holes in their Torpedos and added weight to make the lures sink when they thought underwater offerings would produce better. Sinking Torpedos. Black lures!

Along these lines of thought, my artist pal, the late Ned Smith, who knew the Susquehanna between Harrisburg and Millersville like his studio, designed an underwater propeller lure. It was a teardrop-shaped lure with props on both ends and was weighted with lead slugs so it was almost neutrally buoyant. It would sink very slowly until the retrieve began; then it would come through the water at a near-constant depth. Ned caught thousands of bass on this lure. It was usually painted black.

In Minnesota and Wisconsin, where

you will then be in a position to suit a small stream's every mood—with the right-sized rod to do the job.

Put me on a little, brushy trout stream with a small rod scaled to the size of the fish and I'm in heaven for a full day. Early in the morning, the trout are usually feeding on the previous night's crop of night crawlers that have tumbled into the water. As the day warms, they switch their attention to tiny spinning lures. Around 2 P.M., flies start coming off. First the trout zero in on nymphs, and as evening falls the fish slap the surface, slurping down dries. To be part of those patterns, and in a position to sample all of them, is one of my greatest fishing pleasures.

It would be wrong, however, to leave the impression that short rods can do everything. They fall short of long rods in two departments: distance casting and striking.

There are times when distance becomes more important than accuracy. When you are fishing big water and need a long reach, as with a burly river or an offshore bar in the surf, long rods will get you where you need to go.

Still, the distance handicap of a short rod isn't as great as you might imagine. I find a 5-foot spin/fly rod casts about two-thirds the distance of a 6½-foot spinning rod or an 8-foot fly rod.

In terms of striking, because you have a shorter swinging arc, short rods are most unforgiving of slack line. If you have too much of it out in front of you, you will not be able to straighten out sufficient line slack to set a hook. To remedy that problem, I've cultured the habit of keeping my rod tip low to the water, pointing it toward my lure or fly, and striking with a full sweep of my arm, rather than a jerk of the tip. This maximizes the effect and offsets the handicap of a short shaft.

With the exception of those two limitations, you'll find the benefits of the short rods far outweigh any of their shortcomings. They are fast, accurate, easy on the arm, and adaptable. Most important, when you match them up to the many jobs they do best, they'll catch more fish.

FRIED TROUT

(Continued from page 43)

found are pushed to the front and removed by the fingers. Mouthfuls are are waiting somewhere in the flesh I am about to eat. I work the ventral side first and find it as safe as a tuna sandwich. Now my attention turns to the deadly dorsal meat, wherein hide those hairlike bones. Every nerve in my mouth springs to full alertness. Every forkful sends my tongue searching through the pile with the diligence of a customs official. My throat stands ready to slam shut even in the act of swallowing. My teeth have suddenly become as sensitive as lips.

The trout makes a valiant last fusillade, peppering my gullet with a barrage of deadly thorns. The bones that are trebly searched and researched before the throat will allow them to pass. Security is tight, but an occasional lunging bayonet breaks through and jabs at the startled throat, scraping painfully in its passage. Yet, in the end, all goes well; I am not entirely unscathed, but I am unbowed. I have been mildly admonished, but I have not been seriously chastised. Justice has not been served. I have gotten away with a serious offense, and my guilt lies heavy upon me. But I remain unreformed. Soon, as the stream leans forcibly upon my legs and the weight of a fighting trout bends my rod, little but the taste of sweet flesh will be remembered of this evening interlude, and the freezer will likely be restocked.

"Just caught the one?"

walleyes and muskies are the only fish considered worthy of a serious angler's attention, black is the ace-in-the-hole color. A giant spinner blade followed by a monstrous black bucktail skirt hiding an equally sizable treble hook is traditional muskie medicine. So is an eel-like rubber lure named the Method Reaper, also in black. An all-black lead-headed jig is a longtime favorite for walleyes, as are live leeches, which are about as black as black critters can be.

In the fly fishing department, black is not presently in vogue, except among a small cadre which tries to keep the "old" news from spreading. Turn to the fly selection list in many of the tackle catalogs from the early part of this century and you'll find the Black Gnat, Black Quill, Black Prince, and others. During the thirties the Black June tied on size 4 and 6 hooks was one of the more popular night flies in a half dozen Eastern states. While colorful numbers such as Parmacheene Belle, Montreal, Professor, and Scarlet Ibis became known as generic "Maine" brook trout flies, the monotone Black Gnat was just as popular with experienced anglers.

When it comes to fishing for sophisticated trout on well-used waters, some of the better observers of the sport have written of the value of mostly black or completely black flies. In his excellent book, *What the Trout Said*, Datus Proper illustrates more than a half dozen ants, gnats, and beetles—all black—and admits to using them frequently. The success of the Letort Cricket, even on waters where there are no natural crickets, is astounding; the same is true of the Black Muddler, Black Ghost, Black Marabou, and a number of other patterns that feature more black than anything else. I suspect the reason more fly fishermen don't use black flies on a regular basis is because they don't look pretty in the fly box.

Atlantic salmon fishermen display a much more benevolent attitude toward black flies. The best producers on most North American rivers include the Blue Charm (which is more black than blue), Black Bear, Green Butt, and Black Dose. On most Canadian rivers, ask a veteran guide which fly to tie on first and nine times out of ten the one he'll pick from your box will be the blackest one he can find. This is not mere whim; black flies have traditionally caught more fish than anything else.

Natural blacks are not quite like the black print on this page. Examine a black ant, a black beetle, a crow feather, the tail of a black squirrel, or a tadpole. All of these will be black indeed at 10 feet or even 2 feet, but when you hold them in your hand and look at them through a reading glass, a gleaming iridescence sparkles brilliantly when the black object catches the light. Some natural blacks are more brilliant than others, but in most you'll spot all of the colors of the spectrum.

In combination with other materials, I use dyed black feathers in some of my flies, but most of the time I'll stick with natural blacks if I can get them. No black feather in this world compares with those from our common black crow for fly-tying purposes. Crow feathers produce the finest beetle wings imaginable. Turn a crow wing slowly under a bright light and you'll see subtle browns, blues, purples, and metallic reflections. Move the same feather to arm's length and it dulls to flat black once more. It's the same with natural black rooster hackle. There is a complete range of near-luminescent colors shining through these feathers, which work well on wet or dry flies. Just last season I saw more than a dozen trout refuse a size 20 dry fly tied with dyed black hackle, then take the same pattern tied with natural black.

Because of the disappearance of certain mayfly hatches on some waters these days, more fly anglers are turning to terrestrial imitations. One of the best is a simple beetle tied with crow wings, natural black legs, and a peacock herl body. Even when other naturals are present, I have yet to see the trout that couldn't eventually be coaxed into taking a black beetle of the right size, provided the cast was made well. I wouldn't want to be on any trout stream in the world without a good supply of black beetles in a range of sizes from 8 to 20.

It occurred to me to find out if my pet trout would eat a black fish pellet as quickly as they would a brown one. In a pool just 100 yards from my typewriter there live a dozen browns that depend on me for most of their food, in the form of prepared trout pellets. The pellets are about an ⅛ inch in diameter. How to color a pellet black proved to be a problem, since it crumbled when painted with a felt-tip pen and I didn't have any black vegetable dye. I finally used flat black paint. If a trout swallowed a painted pellet, the fish's digestion might be upset, but in the interest of science I risked it. Three different fish came to the black pellets like gangbusters and promptly ejected them. (No painted pellets for them, thank you!) But the experiment did show that the phony black pellets looked like something good to eat (these fish do eat natural black beetles). Even if they did reject it, I could still have hooked it.

The overriding message here is that freshwater gamefish do not spook from black, but find it a perfectly normal color in any environment. They can shy from or be attracted to any other color on given days, but seldom, if ever, does black indicate danger or cause extra caution. Indeed, the opposite is usually the case. Black means something to eat, and the fish will usually have a second look.

Like the society matron's basic black dress and the gentleman's black tuxedo, which are always in style, the angler should have his battery of black baits and bugs. The color may look conservative in the fly or tackle box, but try black more often and you might change your basic ideas.

Books & Comments

JIM CARMICHEL'S BOOK OF THE RIFLE, by Jim Carmichel. 564 pps. Illustrated. Published by Outdoor Life Books, Times Mirror Magazines, Inc., 380 Madison Ave., New York, N.Y. 10017. $34.95.

Although Jim Carmichel is not, as the jacket blurb proclaims him, the dean of modern gun writers, his book is the best thing written on the subject within memory, and it will be the best thing around in the forseeable future. Put in somewhat less pretentious terms, this is just a wonderful damn book.

The key to it lies in the photo of Jim on the dust jacket. He is gazing at a custom sporter, and the expression on his face is one of True Love. He, like all Brothers in the Fellowship of the Rifled Tube, is just as goofy about guns now as when he was a kid in Tennessee, poring over catalogs and gun magazines. It is that tremendous enthusiasm, that love of the subject, that shines through on every page.

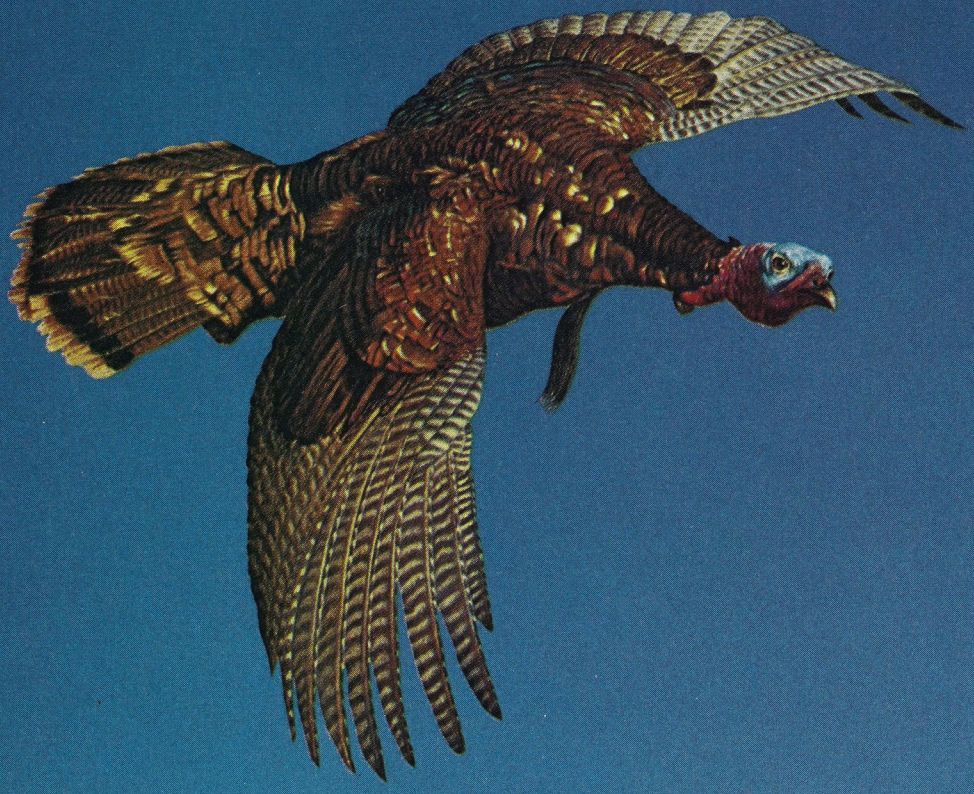
Carmichel is a rarity among gun writers in that he has been an active participant in every phase of rifle shooting that you can think of. Most become interested in one or two facets of the game and make a career of that. The author of this book, on the other hand, has expended a couple of hundred thousand rounds at every form of rifle target: Smallbore and Highpower competition, varmints, big game, silhouette, benchrest, and any other form of endeavor that can be undertaken with a rifle.

Carmichel is also distinguished by an engineer's eye for how things work. He will not say, for example, that a hook-type extractor works as well as rotating-claw type, and let it go at that. He will go over the reasons for both, the advantages and disadvantages of each, bring in a test that a manufacturer conducted and what it means, and at the end, you will know more about extractors than you ever thought possible.

If there is any criticism of the book, it is a recurring theme of "I'm right and all these other guys were wrong all those years." Maybe, but after you come across it the third or fourth time it starts to wear.

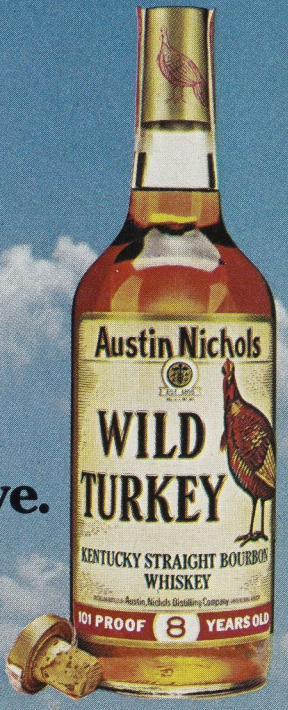
There are twenty-one chapters on all phases of rifles and rifle shooting, including hunting, and each chapter has numerous and excellent diagrams and photos. You will not be able to read it at one sitting, or a dozen, because there is a lifetime's worth of information between the covers.

This one is a classic, right up front. Get it.—D.E.P.



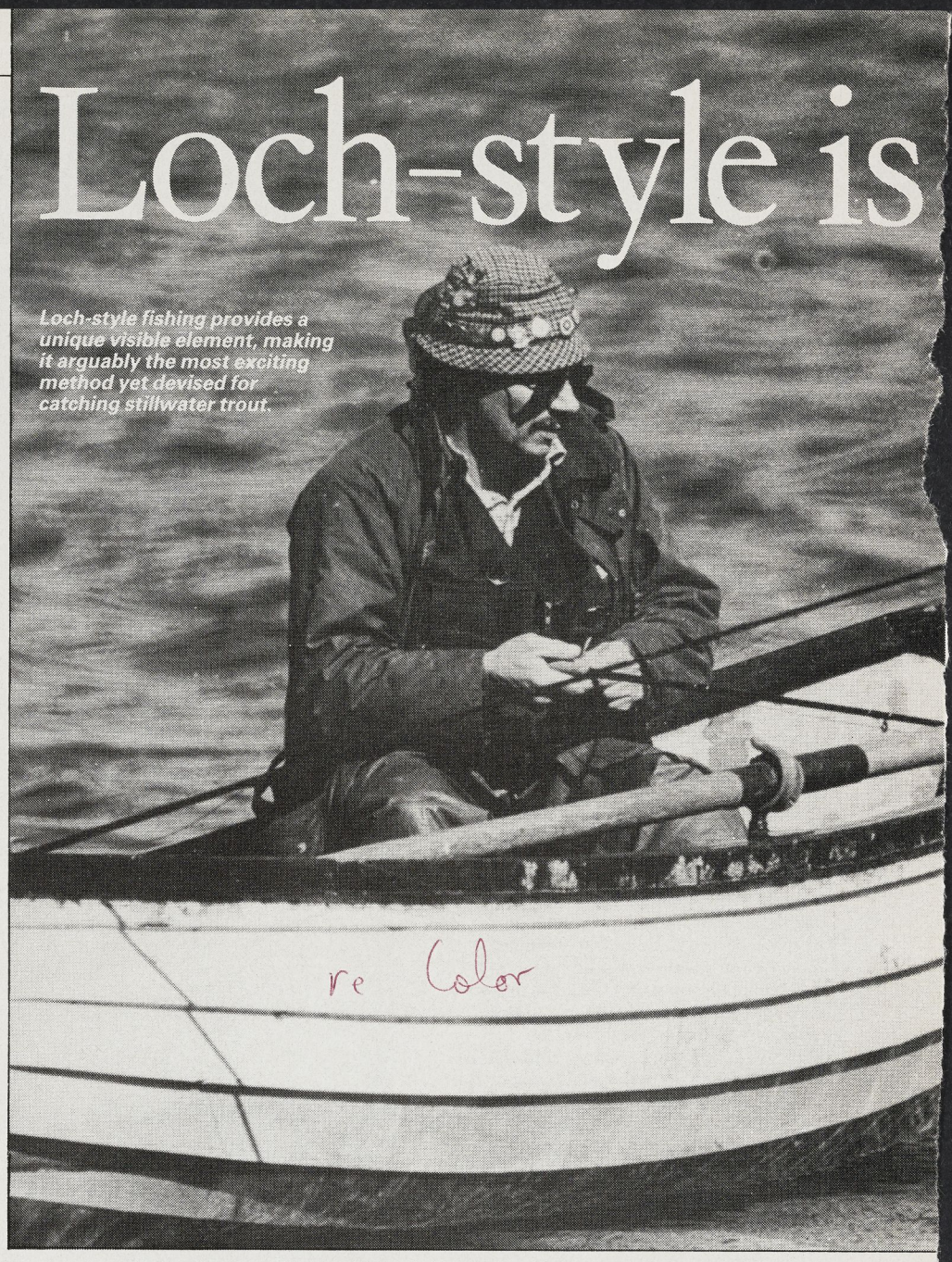
Fly First Class.

Wild Turkey. It's not the best because it's expensive. It's expensive because it's the best.



Now you can send a gift of Wild Turkey® /101 Proof anywhere* by phone through Nationwide Gift Liquor. Call Toll Free 1-800-CHEER-UP (Arizona 602-957-4923). *Except where prohibited. Major credit cards accepted. Austin, Nichols Distilling Co., Lawrenceburg, KY © 1985.

Loch-style is



Loch-style fishing provides a unique visible element, making it arguably the most exciting method yet devised for catching stillwater trout.

A MISCONCEPTION currently popular among stillwater trout-fishers is that loch-style fishing is restricted to competition use. Nothing could be further from the truth.

Loch-style represents, for me, an ultimate pleasure in my sport from April to October. It offers everything I hope to find in the pastime. It combines modern thinking and technology with traditional methods, patterns and ethics, and it becomes, for me, the purest definition of angling. It is also highly successful.

Loch-style is all about top-of-the-water fishing. Both in competitions, and in the history of the style, sinking lines are used and permitted, but for many anglers they are superfluous. The floater is an altogether more relevant and subtle tool: it is pleasant to use, gives greater 'feel', and means that the unique visual element is of paramount importance.

So this series is strictly about top-of-the-water fishing. I shall be looking at all the seasonal variations that can occur, the different flies, the tackle, and the techniques. The angler needs to adjust both his method and approach from month to month; and to understand the varying nuances of style is to be in with the best chance of success.

An awful lot or rubbish is talked about what constitutes an ideal boat-fishing outfit. Any rod of 9ft 6in or longer will suffice. Some people advocate 12ft rods, and in some circumstances — when dibbling flies in the surface film, for example — a long rod can offer an advantage. However, the strain on the wrist from casting a 12ft rod all day is considerable, and a lot of anglers will opt for a shorter one, something around 10ft being the most common. Lighter lines are much in favour at the moment, as they give a correspondingly gentler presentation, and my own choice is a No 6 fished on a suitable 9ft 6in rod. I find this combination gives the perfect blend of strength and subtlety, and yet the rod retains latent power reserves to tackle almost every eventuality.

There are few hard-and-fast doctrines about boat fishing. There are plenty of rules, but few of them are golden. The well-proven adages of "bright day — bright fly", "small wave — small fly", "big wave — big bushy fly" are all very well, but only on some occasions. Equally, they can all be disproven, with alarming regularity. I like to embark on each day with an open mind, and to try to reach sensible conclusions based on prevailing conditions, linked to the more obvious signs of fly-life and lake contour.

After the unpredictability of April, May sees some degree of stability in the stillwater scene. The weather is improving, the countryside is turning green, the air tastes fresh, and there is a keen edge of anticipation to each day's fishing. Indeed, on the brighter May days, we can be forgiven for thinking that summer has arrived, and a word of caution is well placed.

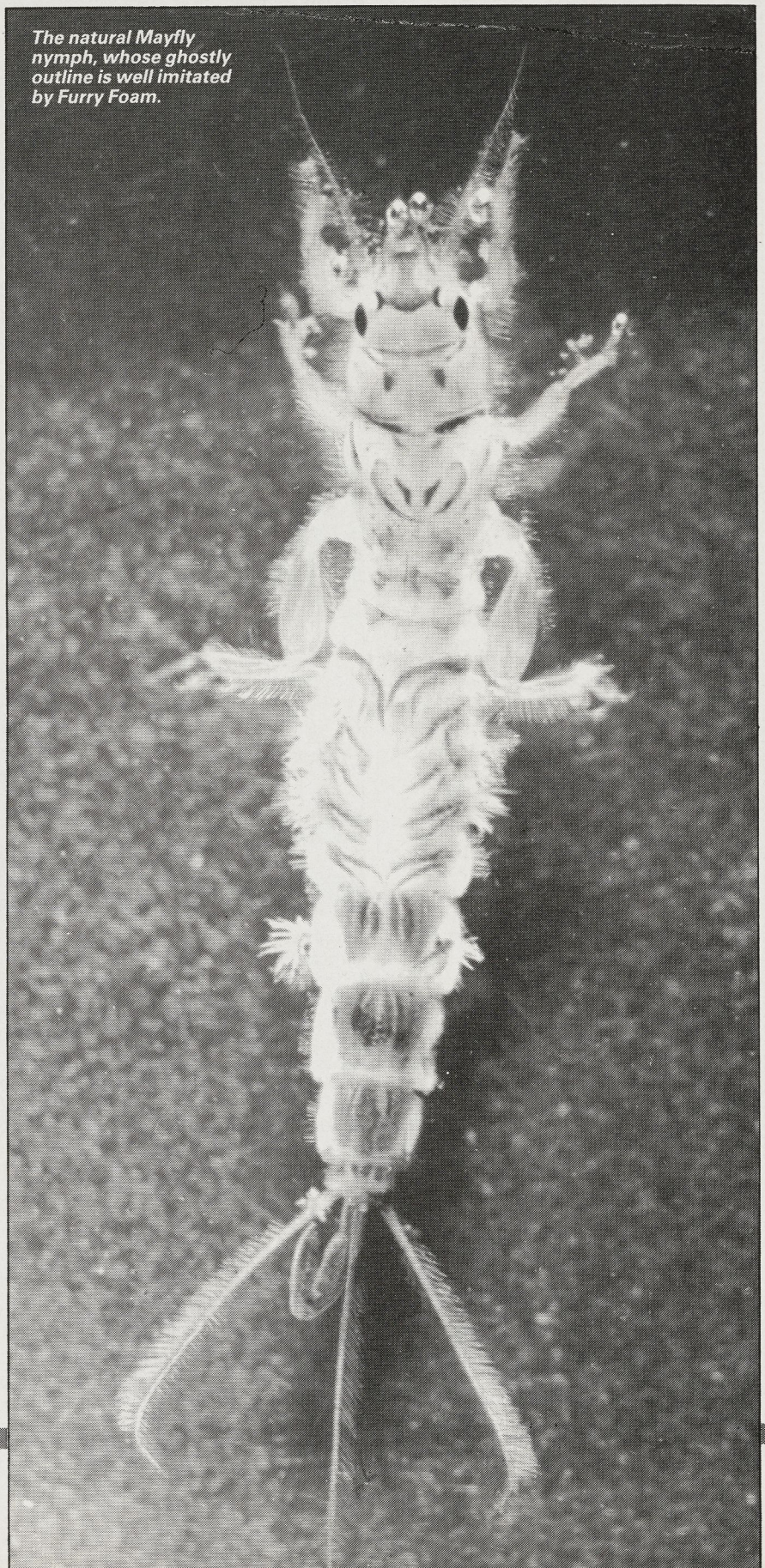
A lot fishermen include a water thermometer among their gear these days, and it often pays to check the water temperature during fishing. It is worth remembering that fish are more reluctant to feed in water below 42 degs Fahr, yet such temperatures are frequently encountered in British stillwaters in spring. Paradoxically, fish do, on occasions, feed quite avidly in very cold water. This is due to a combination of factors. Usually a lot of stock fish are about (which means that competition for food is intense), they are almost certainly feeding on daphnia, and the first real warmth of the year has stirred them into action.

The use of a marrow scoop in early May inevitably reveals concentrations of daphnia, particularly in the richer waters of southern England. These tiny protein-rich crustaceans form the staple diet of many trout during spring, and one would have thought that it was near impossible to imitate them, or to knock a feeding fish "off balance". In practice, the exact opposite is true: general representative patterns, such as the Stick Fly or Pheasant Tail Nymph, are proven medicine for early season daphnia-feeding fish. The trout often take them savagely, accelerating away from their direction of travel to intercept the offering. You cannot imitate the insect, of course, but you can offer a viable alternative.

The range of patterns that loosely represent natural food items should be first-choice point flies in spring. Any day afloat is going to be unpredictable, and localised fly-hatches will probably take place. These should be sought out, and imitated where possible, but for most of the time, the bigger suggestive flies will be the best bet. The trout have seen few food items of any size for the last couple of months, and are more likely to be interested by a sizeable offering, especially one that incorporates a "trigger" factor and bears more than a passing resemblance to the things they are used to seeing on the lake-bed.

In colder weather —and to be realistic,

FOAM MAYFLY



The natural Mayfly nymph, whose ghostly outline is well imitated by Furry Foam.

foam is then wound on, using the stretch method described above, up to a point one-third of the shank length behind the hook eye, where it is bound down but not cut off. It will assist in the tying-in of the cock-pheasant tail-fibres which make the wing-cases if the Furry Foam strip is left bound down beneath rather than on top of the hook-shank at this point. Next, the gold oval thread is wound up over the foam in wide turns — four or five will suffice — and the end tied down and snipped off where the foam was stopped.

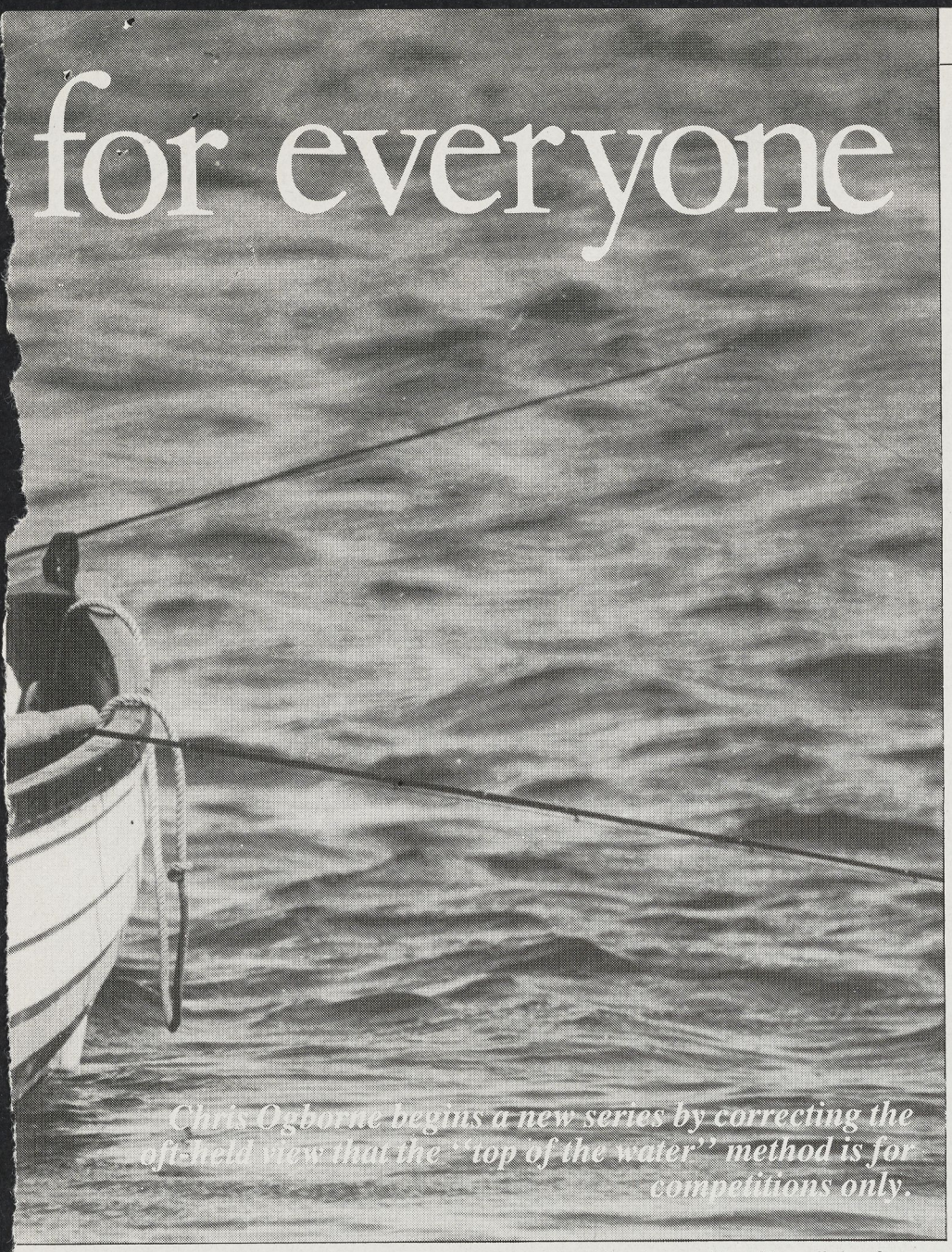
The cock-pheasant tail-fibres which will form the wing-cases are tied in on top of the hook-shank, the waste ends being cut off and the fibres swept out of the way towards the tail of the fly. The remaining foam is now wound on to make the thorax. It should be found that enough foam has been left to complete the two or three turns needed for this. The foam is then tied down and any waste cut off. The thorax, being made of the wide end of the Furry Foam wedge, will be nice and thick.

The cock-pheasant tail-fibres are now brought forward over the top of the thorax in a flat strip to make the wing-cases and are, in turn, tied down and the waste ends cut off. Three or four pheasant-tail fibres are tied in at each side of head with the tips pointing back towards the hook-point to represent the legs. These should be about the same length as the tail fibres. When these have been tied down and the waste ends snipped off, a head is formed and whip-finished in the usual way. A coat or two of varnish will complete the nymph head.

An alternative procedure for making the legs is to use the ends of the cock-pheasant tail-fibres which were brought over the thorax to make the wing-cases by binding these down at the front of the thorax and, while so doing, dividing them equally to the sides of the nymph and then reversing the fibres so that, when they are bound down, the ends point towards the hook-point. Thereafter, the head of the nymph is finished off as before. The only difficulty with this method of making the legs lies in the correct judgment of the length of the cock-pheasant tail-fibres when they are tied in at the back of the thorax. A little practice will soon overcome this problem. □

● **Furry Foam may be obtained from Streamside Anglers, P.O. Box 2158, Missoula, Montana 59806, U.S.A.**

for everyone



Chris Osborne begins a new series by correcting the old-held view that the "top of the water" method is for competitions only.

May is mostly about cooler days — the greater concentrations of fish are likely to be found in the shallower areas. Early weed-growth takes place in such areas, with a correspondingly greater proliferation of fly-life. Early-season midge hatches are likely to be in the smaller sizes, and you should ensure that your fly-box contains a good variation of both colours and sizes — certainly down to 14s, and preferably 16s as well. This is where the lighter-rod-and-line philosophy comes into play, enabling the fisherman to reduce leader diameter and to fish these smaller patterns more effectively. If a decent wave is blowing, and the small flies are hatching, then a cast of small Black Pennell (14), Buzzer (14), and perhaps a Wickham's (12) on the point will be ideal. Never be afraid to reduce fly-size in early season.

Another myth that needs to be dispelled is that loch-style is all about short-lining. It can be, but not always, and May is very much the time to indulge in the Bristol speciality of long-lining from the boat. This has developed almost into a style on its own, as it involves a marked variation in normal boat-fishing skills. The long-liner will invariably reach fish well before his partner, and the ability to cover a fish at some 25 yds range means that the caster has probably another two or even three chances as it moves towards the boat. Casting skill is at a premium, and you need to be able to lengthen the line with a minimum of false casting for this method to be effective. During May, trout will often be moving in a relatively haphazard way, far from the predictable up-wind line of travel that they adopt when food items are more plentiful. Consequently, a fish spotted at long distance will not necessarily move into range, and the ability to cover it quickly may well be repaid.

Unlike the warm-weather months, May offers far less variety of fly. Early in the month, it will still pay to avoid red flies, or at least flies with too much red in them, as this tends to attract the aggressive instincts of the cock fish that are still un-mended from their spawning. But for the rest of the time, my own choice centres on the general representative patterns already mentioned, judiciously blended with a good selection of the brighter traditionals. Silver Invicta, Peter Ross, and Teal and Green are a good early-season choice from the boat, with flies such as Black Pennell or Black and Peacock Spider being reserved for the more sombre days of heavy cloud cover. The Connemara Black is a particular favourite for me, especially on my home water of Chew, where it seems really to bring the fish up in bleak and windy weather.

Towards the end of May, when the buzzer hatches are becoming well established, the first sedges begin to appear, signifying a pronounced change in style and fly selection. Loch-style is not always about drifting — a fact to which any angler who has been becalmed on a bright and brassy day will willingly testify. Quite often, the top-of-the-water fisher has to contend with the dreaded flat calm, although in May at least this is not nearly as bad as in, say, August. Surface film fishing, with either a spent-wing Midge or perhaps a general pattern dry sedge, can be really exciting: care should be taken to observe the obvious rules of boatcraft, as any unwarranted noise or vibration will quickly put the fish down. But those anglers who *are* prepared to try the dry fly, or at least the spent-wing patterns, may well find that all is not lost in the flat calms. Try to choose a part of the lake that is bordered by rushes or withies, as these will harbour a lot of natural food, as well as providing take-off points for the emerging nymphs.

Late in the day, the proverbial evening rise is a major bonus to the boat-fisherman. Even on the most unlikely occasions, the gale-force wind can drop, the temperature can hold in the high 50s, and the midges can start to hatch with a vengeance. The fact that the wind drops in the evening means that the normal loch-style drifting techniques need to be abandoned, and the boat becomes little more than an elaborate casting platform. But as the breeze dies, so those magical wind lanes appear, and there is no doubt that these draw the fish like magnets. The boat should never be anchored anyway, but to block a wind lane with a moored boat borders on the criminal.

May is a season of contrasts, but it is also a season of plenty. Boat bookings, sometimes made months in advance, can manifest themselves in the form of warm and gentle spring days, or they can be viciously cold with biting winds from the north. Either way, they can present an endless variety of fishing conditions, most of them fascinating, and all of them exciting. Summer has not properly arrived until June is with us, but for the moment there is pleasure enough in savouring the freshness of the new season. □

ANGLING REPORTS

England and Wales

AVON (Hampshire) and Wiltshire tributaries

SALMON CATCHES on the **Avon** were a little down on last year, although at Somerley 17 fish were landed up to April 6 and on the Royalty water, 14, the heaviest 31½ lb and 27½ lb. This latter fish had been ensnared in the nets, as evidenced by serious marks on its body. One or two summer fish were coming through earlier than usual.

Electric fishing on a three-mile length of the middle **Wylye** produced some 300 lb of pike, with fish up to 19 lb 4 oz, and an estimated 200 lb of eels, while a similar operation by Salisbury and District AC at Amesbury on the Avon turned up 98 pike, including a monster of 23 lb. Members are reminded that guests may be invited to fish this stretch, the fee being £3, not £5 as had been proposed.

Rods at **Langford Fisheries**, Steeple Langford, averaged 2.5 fish per visit at an average weight of 2¼ lb, with the heaviest a rainbow of 4½ lb. Trout were showing at the surface by early April, and nymph patterns did well.

Medium olive and iron blue imitations are standard dry flies on rivers at this season, while hawthorns and black gnats are often on the menu. The grannom may be hatching on the **Nadder** as this report is published, and the Mayfly should appear on the Avon by May 15 and on the Wylye some ten days later. — G. MACKIE.

BAYHAM LAKE TROUT FISHERY

RESULTS during the first five days of the season (up to April 7) were exceptionally good, with 854 fish being taken by 236 rods, giving a bag average of just over 3.7 fish per rod. The total bag included 86 fish over 3 lb, of which 56 were between 3 lb and 4 lb, eight over 4 lb, one over 5 lb, three over 6 lb, 11 over 7 lb, and five over 8 lb. The two best fish were 9 lb 2 oz by Jack Reilly, of Tunbridge Wells, and 9 lb 3 oz by Ron Fry, of London. The best brace taken over the opening week-end was caught by Mrs Sylvia Pay, of Detling, who took two lovely triploids weighing 7 lb 12 oz and 8 lb 4 oz.

At the time of writing (April 9) the water is still relatively cold and fly-hatches are sparse and of brief duration, but the steady run of mild weather is bringing on both plant and insect-life rapidly and every day sees more surface activity.

Our new stocking policy — using all-female and triploid fish only — has been a great success. The big triploids are growing on fast and it now seems likely that we shall be producing triploids well into double figures rather earlier than we anticipated. — J.P.

LLYN BRENIG

OPENING DAY, April 1, dawned wet and windy, but fortunately, the warmest day of the year so far. Fish were feeding close in and one or two anglers were returning for their second permit in a little over the hour. The shallower water was generally the most productive, with Hafod-yr-Onthren Bay producing several limit bags.

The Water Authority's policy of stocking with all-female rainbows meant that few black fish were about. The Black Lure was the most productive lure.

Best brown of opening day was an overwintered fish of 2 lb 13 oz taken on a Jersey Herd by Mr Pugh, of Doddleton. The best rainbow was 3 lb 7 oz and was taken by another English visitor, Mr Thornton from the Wirral. — D. M. SCUTTER.

BRISTOL RESERVOIRS

NEAR GALE-FORCE winds made opening day, April 2, difficult for both boat and bank anglers. Next day, gale-force conditions caused cancellation of the boats at Chew Valley, but boats were able to operate at Blagdon Lake, which is more sheltered by the Mendip hills.

Since then the south/south-west winds have continued, but moderate to strong, with rain, heavy at times. With these somewhat less rough conditions, the fishing has improved, with some limit bags recorded from Blagdon and Chew by boats and bank anglers.

At Chew Valley five large rainbows have been recorded, weighing 12 lb 3 oz; 11 lb 13 oz; 8 lb 12 oz; 8 lb 10 oz and 7 lb 2 oz.

The shallow areas and bays, such as Heron's Green Bay, Village Bay, Stratford and Moreton Banks, have fished better than the deeper areas, and while sunk lines with lures have predominated, there has been some success with floating lines and small flies, such as Grenadier, other nymphs and stick flies.

Blagdon did not suffer as much from the high winds, and some limit bags, both boat and bank, have been recorded, but as yet no large rainbows.

So the first week has not been a record, but it is early days, and with more clement weather the fishing can only improve. — F. S. POPE.

CARDIFF RESERVOIRS

THE LONG-AWAITED opening day on March 20 at Llanishen and Lisvane reservoirs brought the anticipated rush of anglers to the bankside, and despite freezing temperatures more than 500 fish were brought to the net. Best recorded fish was a rainbow of 7 lb 7 oz taken by local angler Norman Roach. Les Thomas, also of Cardiff, took rainbows of 5½ lb and 3 lb.

Since opening day fishing has been constant, with a good catch-rate which includes a fair proportion of over-wintered trout. Other notable fish to be taken have been a rainbow of 6½ lb by Bill Hughes, of Pontypridd, and rainbows of 10 lb and 6 lb by teenager Nick Fenton, of Cardiff. — COLIN DALLIMORE.

COQUET

THE BACK-END of March saw a rise of water of just over 3 ft, which helped a lot. It was fairly cold water (39 degs Fahr), but it removed a lot of river dirt and cleaned out the river. Bob Crooks, Snr, had a fish of 14 lb from the Swan's Neck, but it was badly scrubbed. The Coquet investigation into 'scrubbed' fish continues, and anglers taking one of these fish are asked to contact Chris Lucas, Secretary, Coquet Angling Improvement Association, 4 Queensway, Morpeth, NE61 2BG (Morpeth 519302).

Bill Barclay had a fish of 8 lb from the White Posts, and I. Snaith, Shilbottle, had one of 7½ lb from the same place. This was his first-ever spring fish and it was taken on a copper Toby.

Down at the Stream Foot, Joseph Hogg, Walkerville, had one of 9 lb to a blue-and-gold Devon, and D. Thompson, Hadston, had one of 9 lb from the Stream Foot to an eel-tail. The best fish of all, and the best so far this year, was a clean one of 20 lb taken by Graham Newton, Ashington, from the Flats on a yellow-and-silver Devon. Up to the end of March the score of salmon taken stood at 20 from the Federation ticket waters. There are a few vacancies for salmon rods to join the Northumbrian Anglers' Federation. Details from Alan Bagnall, Head Bailiff, West Thirston, Felton, Northumberland, but please enclose s.a.e.

Trouting is getting under way. C. Sweet, Ellington, had a nice one of 13 in in good condition near Rothbury to a Snipe and Purple, and Arthur Stuart, Gosforth, fishing a private section, had three around the ¾ lb mark, to Greenwell's, returning two others. — NORTHERN ROD.

CORNWALL

HEAVY RAIN during the early part of April brought rivers up to ideal height for fish to run, and after some lean years for spring salmon it will be interesting to see whether a significant number come into the Tamar and Lynher.

Up to the end of the first week in April about a dozen fish had been taken from the **Tamar**, mostly from the lower reaches, with the best fish one of 18 lb from Gunnislake Weir. By this time fish should be well upstream and into the Launceston AC waters, while on the **Lynher** one or two fish could have reached as far upstream as Plusha Bridge or even beyond.

May is the peak month for big sea-trout on the **Fowey**, and there is a significant run on the Camel in most seasons. The Lynher also has a run of larger fish during May, although on this river they are less inclined to move beyond the middle reaches until later in the season.

Opening day on the reservoirs at **Porth**, **Siblyback** and **Argal** was spoiled to some extent by gale-force winds and heavy rain at times, but nonetheless a fair number of limit bags were made. Some fish were taken on floating lines, and as the weather warms up catches should improve still further as some of the larger fish which have been stocked feed more freely near the surface. For anglers who prefer smaller waters to the large put-and-take reservoirs, a new fishery of one-and-a-half acres has opened at Innis Fish Farm at Penwithick, near St Austell. The fishery is particularly suitable for youngsters learning to fish a fly, and fish to 3 lb have been taken recently.

More than 60 anglers and friends of the late Mike Manning gathered on the last day of March on the banks of the Fowey below Restormel to witness the unveiling of a commemorative bronze plaque naming a pool after Mike on a part of the river which was his regular beat. — B.G.W.

DEE and CLWYD

ALTHOUGH the Dee was running a little high at times, there was some movement of fresh-run fish in the milder conditions of March. There was also increased activity by poachers in the estuary and bailiff patrols were intensified much earlier than is usual.

Although the runs were not large, there was a good proportion of fish in the 15-25 lb range and many were taken in the lower sections of the river. Successful anglers included: Egan Griffiths, two of 15 lb; Mr Blower, 17 lb; R. Livingstone, 19 lb; G. Harrison, 15 lb; and Mr Lee, 18 lb. Towards the middle of March G. Glover, landed two of 15 lb from the Gronwyn Pool at Pen-y-lan, both fresh-run fish. The first was taken on brown-and-gold lure the second on a black-and-yellow Waddington.

Upriver at Corwen one of the first fish of the season was a splendid salmon of 28 lb taken from the Clarks Pool by E. Vernon on a Yellow Belly. The second

Secrets Of Color Underwater

You can buy lures and line in a kaleidoscope of hues and tints. But this fish-eye view of how these products appear may color your thinking on their true value.

By Paul C. Johnson

From just looking at one, you might guess that it had about as much appeal to a fish as a polecat at a picnic. The typical fisherman who comes into a sport shop rarely makes the effort to pick up a homemade lure. Instead, the bright, gaudy-colored, factory-made baits get all the sales action. There is no denying that they have more eye appeal; the trouble is, they were designed to catch fishermen, not fish.

Having worked in a local sport shop during my high school and college years, I observed this buying habit a thousand times. I knew the local, homemade lures took fish. But how do you convince a skeptical customer to try something that doesn't have that name-brand recognition and color sizzle? And when the local homemade-lure makers changed tactics and began putting out lures in those same bright, sales-appeal colors, sales increased —but the number of big fish caught on these lures took a noticeable drop.

You can talk action, size, weight, or shape, but the one factor that seems to overwhelmingly dominate a fisherman's decision to buy and use a lure is color.

A number of terms are used interchangeably among scientists and lure manufacturers to describe color-related phenomena. For example, consider the terms *fluorescence, phosphorescence,* and *luminescence.* Each word describes a different set of chemical/physical properties.

Most sportsmen are generally aware that one class of colors seems to make objects glow in daylight and appear brighter and more visible. An optic orange golf ball, a Blaze Orange hunter's cap, and a red neon-tipped tail on a plastic worm are all examples of this light phenomenon that we call fluorescence.

Substances that fluoresce are those with the capacity to absorb energy at one wavelength and instantaneously remit it at a longer wavelength. Bombard a fluorescent dyestuff with ultraviolet light (or "black light"), for instance, and it will glow with visible light as if it were on fire. Many of us have seen a white dress shirt or a dancer's costume glow under black light in a cocktail lounge. Shut off the black light and the fabric immediately ceases to glow.

This cutting out of light is, in fact, the criterion by which fluorescence is separated from phosphorescence. Cut off the energy source that bombards it and, if the object ceases to glow within 10.8 seconds or less, it is referred to as fluorescent. On the other hand, if the object continues to glow for more than 10.8 seconds after the energy source has been removed, it is referred to as being phosphorescent. Thus, the lures that fishermen charge up under a car's headlights and that continue to glow even on pitch-black nights are phosphorescent.

The term *luminescence* is all-encompassing, including both fluorescence and phosphorescence. It covers a variety of light-emitted phenomena, including chemiluminescence (the famous American Cyanamid Cyalume sticks), bioluminescence (fireflies and ocean-surface night glow), and friction luminescence (the sparks that occur when you snap a synthetic blanket

continued on page 98

PHOTOGRAPH BY WILLIAM ROSTON

Did the worm's fluorescent tail actually provoke this bass into striking?

ILLUSTRATION BY LEON PARSON

The last half of December had been much colder than usual, and early January wasn't much better. After finally forcing myself to go outside and do the usual farm chores one cold morning, I decided that it would be at least 1 or 2 p.m. before a person would have any business trying to find a few quail.

I owned a pointer bitch that was about 5 years old and that I believed to be among the better dogs. I had also just started a Brittany pup of about 6 months that had enough natural ability to make most men brag a little about their dog training, even if unjustified. Dog men and fishermen seem to possess bragging ability now and then.

I had seen many quail seasons come and go, and several good dogs, long gone, linger in my memory—dogs that never loafed on the job. They were always willing partners, no matter how hard the conditions.

I wonder, sometimes, if the dogs we remember as less than great just never understood what we really wanted because our training could have been better. It is always easier to lay the fault on the dog, I guess.

On dark, cold, and dreary days, thoughts such as these seem to find their way into our minds—or maybe they come to mind because we're getting a little older and we reminisce more.

I looked out the window one more time around noon and saw that the sun had finally come out. It looked warmer, anyway. I had a quick bite to eat and stepped out to check the weather again. The wind was still blowing from the north, 10 or 15 miles an hour—not the

continued on page 92

at him, *"Naranja sopa, por favor! Naranja sopa!"*

Later, he learned that this meant, "Orange soup, please!" which may have explained why the guide looked puzzled and continued to drive the boat toward the alligator.

The alligator charged out over the top of Mac and belly-flopped into the water beside the boat. Mac instantly filled the air with karate chops, but the alligator got away unharmed. Afterwards, Mac kept looking up to see what was about to jump on him, and that night he stepped on the frog.

Mac was a great flyfisherman and enjoyed the fight that the big piranha put up against his light tackle. The guide thought that Mac was crazy. He then demonstrated to Mac, Ted Kaphan, and the Old Man the proper way to catch fish. He baited a No. 10/0 hook with half a piranha and hurled the 80-pound-test line and a chunk of lead out into the river. Presently, he jerked on the line and brought it in hand over hand very fast, clubbed the big fish, and dragged it into the boat. He had landed the fish in 30 seconds. He could not understand why the Americans liked to play with their fish.

The Americans caught many fish that morning, including piranhas, dorados, pintados, pirarucú, and others that they could not identify. Ron Hart had told them that the Pantanal rivers also held cachurro, peacock bass, filhote, and fish that even Ron didn't know. The Old Man followed his practice of catching the fewest and smallest fish, so as not to embarrass his companion, but even his fish were big and strong and fought well and, after four hours, the Old Man's arms ached from catching fish. Ron had said the the Cuiabá was by no means the best of the Pantanal's fishing rivers, and that there were many others much better, but the Old Man was satisfied with the Cuiabá and even elated. It beat the heck out of ol' Delroy Heap's beaver ponds.

It was actually Clare Conley and he was actually assigning me a story on fishing in Brazil.

At noon, the guides took the Americans back to the fishing camp, where they ate piranha soup, which was very good and had just a tiny bite to it.

Then, the Americans fell into their beds and slept for two hours straight, until Paulo awoke them and said that it was time for the farewell party.

"What farewell?" Cliff Stoudt croaked. "We just got here!"

"Yeah," Ted Kaphan said. "We're supposed to fish for three more days!"

"I'm just getting the hang of catching all these weird fish," Brian Sipe said. "We can't leave now."

But Paulo said that there had been a change of plans. The Americans had to be rushed back to Cuiabá for a round of parties. There appeared to be no end to Brazilian hospitality, and the Old Man thought that he had never met a friendlier and warmer people. Still, he wanted to fish. By the time he returned home, he would have traveled a total of 14,000 miles to fish a total of four hours, which was not nearly enough. Hemingway would not have left after only four hours of fishing.

After the farewell party the next morning, the Old Man tried to detect sensation in his extremities but could find none. The other Americans, Brian, Cliff, Mac, Ron, and Ted, stared forlornly at the river and remembered the great four hours of fishing.

"Maybe there's been some mix-up and they got it all straightened out and we'll get to fish for another three days," the Old Man said. "Look, here comes Paulo. He's smiling! I bet he's going to tell us that we get to stay here and fish! What do you say, Paulo?"

"Excuse me, let's go."

UNDERWATER COLOR

continued from page 32

against itself while shaking it out in a dark bedroom).

So much for textbook theory. What the books don't cover is exactly what happens *underwater* to the fluorescent and non-fluorescent colors used in lines and lures.

What happens to color underwater? Are there some fundamental rules at work in that marine world that we can predictably apply, even though we may never become scuba divers?

It all started in the late 1960s. The American fishing tackle industry was undergoing dramatic changes, and corresponding changes were taking place on the American fishing scene, with new demands being put on fishermen and their tackle. Fame and fortune were at stake for both the angler and for the tackle manufacturer who could offer a combination that caught fish and won big-money tournaments.

One of the changes that captured the attention of anglers was the use of fluorescent colorants in tackle. Hunters had already proven that Blaze Orange gave better visibility to clothing in the woods. It seemed perfectly logical that it should also work in a lure or a line. But did it truly impart higher visibility underwater? That's where the confusion began.

Physicists' treatises attempted to explain how fluorescence works. They pointed out that visible light is only a small portion of the total electromagnetic spectrum of energy. On one side of this visible spectrum are the shorter wavelengths of energy, ranging from invisible, ultraviolet light on down to the even-shorter X-rays and radioactive energy rays. On the other side of this energy yardstick are the invisible infrared rays and, beyond this, radio waves and TV wavelengths. Each kind of energy can be precisely measured and defined in terms of its wavelength in meters. Because visible light consists of energy at extremely short wavelengths (as compared to radiowaves), scientists measure its wavelengths in terms of *nanometers,* which simply translates into .000000001 meters. Since a meter equals 39.37 inches or slightly more than a yard, a nanometer is hardly something that you can measure with a yardstick. Today, however, nanometers can be measured very precisely by using a laboratory instrument called a spectrophotometer.

Divers at the U.S. Navy's Groton, Connecticut, submarine base, in a series of thought-provoking studies, took various colored test panels into waters of different degrees of visibility to see which ones were the most readily detected underwater. Divers concluded that fluorescent-colored panels were the most visible.

Modifying the procedures described in the Navy studies, I painted metal panels with a multicolored rainbow spectrum ranging from deep blue, green, and yellow, through orange, and finally into the deep reds. One spectrum was created only with non-fluorescent paints. A second was generated only with fluorescent-colored paints.

My first experiments were made in fishing waters in the upper Midwest. Above water, whether in bright, noon-day sun or on a day that was dim and overcast, the fluorescent colors glowed gloriously in contrast to the non-fluorescent ones.

From extensive tests on color perception by the human eye, scientists know and have reported that not all colors are perceived equally. If you have ever tried to buy a navy-blue sport coat only to discover that you chose black, you can appreciate the human eye's shortcomings. The fact is that the zone where the human eye sees best is in the lemon-yellow chartreuse colors. Many people mistakenly think that orange or red occupies this peak sensitivity zone, which is why reds and oranges are used by many highway-safety crews.

For a brief time, manufacturers of hunting clothes put out safety clothing in a bright, fluorescent, lime-yellow color. Technically, they were correct, but they failed to take into account that approximately 7 percent of all people have an eye deficiency that makes them perceive this chartreuse color as white—which, in the woods, can prove to be a fatal mistake. Switching to a fluorescent orange or red slightly farther along the sensitivity curve eliminates this problem.

My first trips underwater were in the zero to 30-foot range. In most freshwater lakes, this stratum offers the best opportunity for taking underwater photographs at reasonable light levels and shutter speeds.

There was no difficulty seeing all the colors in the top five feet. Things started changing when I dropped down to 10 feet, where the non-fluorescent reds started to turn a dingy brown. I saw absolutely no change in the fluorescent colors; they remained bright and highly visible in their "true colors." At the 20-foot mark, the non-fluorescent red had gone black and the orange was a deep brown. Even the non-fluorescent yellow had started switching to a pale, almost white color. There was still no change in the bright, glowing, fluorescent colors, but the available light was dropping fast and I had to fall back on shutter speeds of one-quarter second, even with ASA 200 film.

I wanted to go deeper and find out at what depth the fluorescent colors began playing tricks, but how would I be able to record these changes when the freshwater light levels were too low? The answer was obvious: I needed clearer water that would transmit more light to greater depths.

One of the greatest spots I know for con-

→

ONTARIO

THINK SPRING FISHING

It's Plan-Ahead time; make your reservations for Spring fishing fun! Walleye season opens mid-May. We offer modern facilities; everything you need! For full details, write today or Phone **Area 705/869-2239**

Agnew Lake Lodge
P.O. Box 70 • Webbwood, Ontario P0P 2G0

Now you can own

Top Hunting & Fishing Land

As low as $29/acre and $50 down

*****Government reports more fish and game per square mile. Rated best in North America.

Thousands of acres in prime locations in Canada to choose from. Easy payments. Title and Buy Back Guarantees. Purchased through estate liquidations.

Get your **FREE CATALOG** now.
Write to: **Canadian Estate Land Corp.**
2411 Yonge St. Suite 303, Dept.24D.
Toronto, Ont., Canada, M4P 2Z1.
Tel. (416) 488-0444. **TOLL FREE 1-800-387-6005**

FALL BEAR HUNT PACKAGE $300 US
Includes Accommodations, Boat, Motor, Gas. 7 Nights. Fishing packages also available.
BRUCE'S WHISPERING PINES RESORT,
Box 1510, Atikokan, Ontario P0T 1C0
(807) 929-2211

BLACK BEAR

Spring and Fall hunts for Black Bear—Package plans for Moose hunts and Fishing also. Fish for Walleye, Northern Pike, Perch, Whitefish and Trout. American Plan, Comfortable H. K. Cottages, Outpost Camps. Trailer parking on Ivanhoe Lake. Boats and Motors. Open all year.

RED PINE LODGE
Russell and Shirley Litt
Box 94B, Foleyet,
Ontario P0M 1T0
Tel: 705-899-2875

See us at: Cincinnati Sports Show #38
Columbus Sports Show #156
Pittsburgh Sports Show

"ALL OVER THE MAP"

Ter **AMAZONAS—ORINOCO**
H + **Top Fishing** (Season Dec–Apr)
Peacock Bass—Pavon + other Species.
Caribbean—Tarpon, Sailfish, Marlin.
A.S., Aptdo. 913, Valencia, Venezuela.

HUNTERS WANTED FOR AFRICAN SAFARI:

To Hunt Elephants and Buffalo with Bow and Arrow for Magazine Story in Leading German Magazine.
Please call collect: (212) 838-8550
or write Y. Luter, STERN MAGAZINE CORP.
60 East 56th Street, New York, NY 10022

Sail a tall ship
to small Caribbean islands.

6 or 14 days from $425
Write for free Adventure Booklet.
Box 120, Dept. OL,
Miami Beach, Fla. 33139.
1-800-327-2600
Windjammer Barefoot Cruises

FISH BRAZIL 1985
For further information write or call:
SPORTSMANS SAFARIS, INC.
405 VINE STREET, RENO, NV 89503
PH: (702) 747-2747

JIM McCARTHY
Adventures
International Hunting, Fishing and Photographic Consultant
t/a J & B Enterprise
4906 Creek Drive • Harrisburg, Pa. 17112
717-652-4374 **717-545-1952**
NORTH AMERICA - AFRICA - AUSTRALIA
7 day African trip, 6 animals. Plane fare included $4,600.00
Specializing in Bear - Sheep - Moose - Caribou

MT. STATES—U.S.A.

MOUNTAIN SPLENDOR HIDEAWAY
Secluded Cabins nestled on private hi-country ranch bordering Grand Mesa & Gunnison National Forests. Fish private and forest lakes, horses, jeeping, camping, boating, hiking–Breathtaking Scenery; photographer's delight. May through September. Vacation of a life-time.
ELK–DEER–BEAR **Sept., Oct., & Nov.**
3 ranch houses • Hunt ranch & adjoining National Forest. Hunt on your own–we pack out game.
G-R BAR RANCH Paonia, Colorado
Call: (303)744-3255
or write: 2170 S. Delaware,
Denver, CO 80223

COLORADO
ELK — DEER — BEAR
Bow • Black Powder • Rifle
Summer Fishing - Photo Trips
San Juan Mts & Uncompahgre Plateau
Pack-in, full service camps
Uncompahgre Fur Company
P.O. Box 935 Delta, CO 81416
PH (303) 874-8196
Licensed. Bonded. Insured Outfitters

DEER **QUALITY** **ELK**
Phone (303) 242-0377
Camps, Guides, Equipment
Experienced
DJ OUTFITTERS
Don and Jeff Cardin
Box 147 Grand Jct, CO 81502
ANTELOPE Archery Rifle **BEAR**

ELK—DEER
Pack-In
Guided or Drop Camps
LION Hounds
BEAR Combo Dogs & Bait
20 yrs. Outfitter
Former Gov't. Hunter
HOLLIS ATWOOD
Phone: (303) 835-8345
P.O. Box 21, Eckert, CO 81418

COLORADO TROPHY HUNTS
ELK & DEER BEAR & LION
Flat Tops Wilderness Area
Archery, Muzzleloader & Rifle from Lodge or Drop Camps for Elk & Deer
Bear from Bait Lion with Hounds
Enjoy Summer Fishing & Pack Trips from our Lodge
"Budges"
WHITE RIVER RESORT
Jack & Elaine Harrison
21679 E. Otero Pl., Parker, CO 80134
(303) 690-6627

COLORADO
Established guide business for sale. Includes livestock, equipment. & permits. Serious inquiries only.
P.O. Box 842, Clifton Colo. 81520.

SAMMONS BROS.
GUIDES & OUTFITTERS
303-434-5793
Box 1346 · Grand Junction, CO 81502
Quality Guided Archery, Muzzleloader and Rifle Elk, Mule Deer and Spring Black Bear Hunts
Extensive Guide Training School conducted July & August
Colorado Guide & Outfitters Association licensed, bonded, insured

---

ELK DEER BEAR LION
Rifle, Muzzleloader, Archery, Fishing & Photo-trips HUNTING CAMPS TO SUIT ANY HUNTER - Hunt with one of Colorado's most experienced Outfitters. Limited groups.
CHUCK DAVIES (O) 303-464-7421
3461 F ¾ Rd, Rte 1
Clifton, Colorado 81520
Full time Professional Guide & Outfitter, Over 25 yrs. exp.

ELK • BEAR • DEER
60% success on six point bulls, western count. "84"
100% success on 1984 Bear Hunt
Guide School — Private Hunting — Bow or Rifle
JOHN LAMICQ
635A 19½ Rd., Grand Junction, CO 81503
(303) 243-1082

Colorado Big Game Hunting at it's Best
BEAR • LION • DEER • ELK
Also Trophy Hunts
Archery • Muzzleloader • Rifle
Guided Hunts or Drop Camps
Book Now. Limited number of Hunters Accepted.
WILLIAMS GRAND VALLEY OUTFITTERS & GUIDES
0704 - 300 Road, Parachute, CO 81635
(303) 285-7346
Licensed & Experienced

TROPHY ELK & DEER HUNTING IN NORTHWEST COLORADO

We still have very good camps left for the 1985 Hunt. License Guaranteed. No need to ride a Horse. Prices start at $295 for a 5-Day Drop Camp Hunt with everything included except license. $395 for Elk. Private & Forest Hunting. Outfitters License #62.
Colorado Elk Hunter's Inc.
P.O. Box 227
Hygiene, Colorado 80533
(303) 651-1208

COLORADO
DEER, ELK, BEAR & LION
RIFLE & ARCHERY SUMMER FAMILY TRIPS
Hunt conducted from Pack in Camps
GUIDE TRAINING. Course is for our own use. It is a top up to date course. Given in July & Aug.
WALLACE GUIDES & OUTFITTERS
Box 367, Collbran, Colo. 81624
For Bookings Call:
(303) 487-3841 or (409) 732-3374
Owned & Operated by
ROY CLOAT & BEN HALAMICEK
Full Time Outfitters

COLORADO
ELK • DEER • BEAR
RIFLE • ARCHERY • MUZZLE LOADING
Hunt Colorado's Most Productive Area.
Licensed Guides Drop Camps
OAKCREEK OUTFITTERS & GUIDES
Mike & Karen McFarland, 4722 East 113th Ave.
Thornton, CO 80233 • (303) 457-9903
Member Colorado Guides & Outfitters Assn.
Reserve Before April 1st '85 & Save 10%.

ELK **LION**
SOUTHWEST COLORADO
We cater to hunters looking for Trophy Size Game and willing to work hard to obtain them. Very limited number of hunters accepted. Good, clean, outdoor camps.
JIM BRYCE
1073 Highway 65
Austin, Colorado 81410
DEER **(303) 835-8363** **BEAR**

Alpine Outfitters
ELK • DEER • LION • BEAR • ANTELOPE
- High Country Pack In Elk Hunt
- 7 Day Elk and Deer Comnination Ranch Hunt
- Outstanding Mule Deer Hunts
- Archery and rifle hunts. Over 20 yrs. experience

Private Property TROPHY HUNTS
Hunts designed for the true serious trophy hunter. Hunts in Western Colorado and Northern New Mexico. PRIVATE RANCH HUNTS Deer and Elk:
JACK CASSIDY, OUTFITTER
1640 M Road, Fruita, Colo. 81521 (303) 858-3352

BEN PINKHAM GUIDE SERVICE
Bow, Rifle & Muzzleloader Hunts in Western Colorado.
BEAR • DEER • ELK • ANTELOPE • LION
Write for free brochure & Nationwide references:
1502 2600 Road OL, Star Ranch,
Cedaredge, Colorado 81413
(303) 856-6819

FOR SALE
Guide & Outfitting Business, Includes: Horses, Tents, 4 Wheel Drives, Permits and all related items. This is a large, complete business located in Western Colorado.
P.O. Box 343
Collbran, Colorado 81624

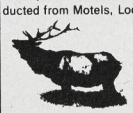
BEWARE HUNTERS
Don't Take a Chance! Book your Elk - Deer - Bear & Lion Hunts with some of the most experienced licensed Outfitters in COLORADO. All type Hunts. ***Phone:***
Dick Pennington Guide Service Ltd.
(303) 242-6318
Chuck Davies Guide Service
(303) 464-7421

DEER LION
ANTELOPE
ELK BEAR
Private land trophy hunts from our modern lodge.
Pack in bear hunts. References furnished. NRA contract. Full time outfitter.
Chris Loncarich, Guide & Outfitters, Inc.
P.O. Box 634, Clifton, Colo. 81520
(303) 245 8183

PARMLEY'S GUIDE SERVICE
LION • BEAR • DEER • ELK
Modern Lodge. Summer Fishing Trips with 4-Wheel Drive Rigs. Bow and Muzzle Load Hunts. James Parmley Guide.
RAY PARMLEY
LICENSED & BONDED
GUIDE & OUTFITTER
P.O. BOX 87, SAPINERO, CO 81247
PHONE-303-641-3116

COLORADO—WELL ESTABLISHED HUNTING OUTFIT FOR SALE. Chris Carnes, P. O. Box 3117, Grand Junction, CO 81502. (303) 243-0456 or (303) 434-6889, evenings.

COLORADO **ELK DEER BEAR LION** **MONTANA**
Quality Deer & Elk Hunts from $600. Hunts Conducted from Motels, Lodges, Cabins, or Pack-In Camps on Wilderness Areas. Limited Licenses in Montana. Book by April for "85". Outfitter will obtain your tags.



COLORADO EXPEDITIONS
P.O. Box 728-O • Cedaredge, CO 81413
(303) 856-6162 • (303) 856-6841
Hunting Consultants • Licensed Outfitter
Member of Colorado Guides & Outfitters

TRAPPERS LAKE LODGE
Hunt ELK & DEER in center of Primitive Wilderness area of White River Nat'l Forest.
Also, Fishing Trips & Combination Hunts
RIFLE • ARCHERY
Remote Pack-In Camps on Horseback. Full Service Guided Hunts or Drop Camps. Summer Sightseeing & Fishing Pack Trips. For information Write:
DALE HOPWOOD, Full Time Licensed Guide & Outfitter
7700 Trappers Lake Road, Meeker, CO 81641
(303) 878-3336

NEW MEXICO—Trophy Hunts-Gun & Bow.
ELK•MULE DEER•ANTELOPE•BEAR•LION
HIGH MOUNTAIN OUTFITTERS,
Pete (Pancho) Trujillo
P.O. Box 244, Eagle Nest, NM 87718
(505)377-2240

CONTINENTAL DIVIDE
GUIDES & OUTFITTERS OF NEW MEXICO

Big Game Hunts • Antelope • Mule Deer • Elk • Bear • Rifle or Primitive Weapons. Limited Trophy Hunts for Elk & Antelope. Private Land Hunting - No drawing needed. License Guaranteed. Families welcome. Summer trips (wilderness). Group & Corp. rates.
505-877-2475 & 505-877-0780
Write: Dept. O, 1903 Lakeview SW
Albuquerque, NM 87105

LION & BEAR
Javalina • Whitetail • Mule Deer
Good Camps • Gentle Horses
95% Success on Lion & Bear
20 Years Experience
RON MOORE
(602) 462-3265
Box 246 • Young, AZ 85554

ducting such research studies is a small island called San Salvador (not to be confused with the city in Central America), situated off the coast of Florida in the southern Bahamas. This island offers predictably clear, clean waters, with visibility, even on a bad day, in the 100-foot range.

My underwater research began on an inviting sugar-sand-covered ledge at the 30-foot mark. The light was glorious, less than one f/stop different from what I had metered at the surface.

Underwater, I frantically gestured for my research colleague to look at the panel. The non-fluorescent colors had shifted just as they had in fresh water. There were no differences in the changes, but they were much more apparent. And the fluorescent colors were glowing brilliantly like neon bulbs.

Ever deeper we descended. Like feathers settling slowly to earth, we adjusted our buoyancy and continued to slip effortlessly down to the coral ledges below us. We stopped on a card-table-size plateau at 60 feet. I worked the cameras as fast as I could, making sure that I bracketed my exposure settings; reflected light can really play tricks bouncing off coral and sand. No flash was used. All photos were made in available light.

The non-fluorescent colors had shifted dramatically. The reds were jet black, the oranges were black, and the yellows were white, although the greens and blues showed only a negligible change. By contrast, the fluorescent reds, oranges, and yellows were still glowing brightly in their true surface colors, and the fluorescent greens and blues glowed noticeably brighter than their non-fluorescent counterparts.

The following day we decided to go deeper. There was a three or four-foot sea rolling on the surface but, as we glided down toward the ledge, we felt nothing except the exhilaration of going to 150 feet to photograph our history-making tests. Because of the risks involved, we had recruited three dive instructors to serve as observers and a safety crew. We had also brought along a cinematographer to record the tests on 16mm movie film. I was loaded down with research and camera gear, while my colleague, who was suffering from an ear infection, was toting the dive slates and meters. We knew in advance that our total bottom time could be absolutely no more than five minutes before we had to start our ascent to the surface.

I kept watching the spectrum panel as we descended. The fluorescent colors glowed cheerily at 75-feet down and, at 125 feet, there was still no change. At 150 feet, the safety men rushed over to us, depth gauges in hand, frantically signaling and pulling us to a stop on a coral-encrusted ledge.

I propped up the spectrum panel and began squeezing off camera shots, but my scientific partner was slow getting the depth and time logged in on the diver's slate. I turned to spur him to action and, peering through his face mask, saw that his eyes looked as big as silver dollars. His head was bobbing back and forth, and his jaw was quivering. I signaled for help and, in a flash, the safety men rushed in. My partner was going through a bad case of nitrogen narcosis. He needed help and fast.

One safety man had stayed behind and, as the others started toward the surface, I signaled for just one more photograph—a low-angle shot of the brightly glowing fluorescent colors. My knee rammed into a coral head but I ignored the pain. Then, I suddenly felt the safety man's hand clutching me and pulling me toward the surface as he pointed to his bottom timer.

As we ascended, I looked back toward the wall and cussed myself for not doing one more experiment: pushing the spectrum panel off the ledge and continuing to watch it to see if the fluorescent colors ever stopped glowing as it silently slipped down that 2,000-foot cliff. I hoped that I'd get another chance.

Then I felt my knee burning and looked down. There was an olive-drab-colored moss on it and, no matter how frantically I tried to brush it off, it kept coming back. I was fascinated with the seeming ability of the moss to regenerate. It wasn't until we reached 10 feet that the olive green abruptly

The oranges were black, and the yellows were white.

turned red and I realized that the moss was my blood.

As I was soon to learn, coral wounds are prone to infection. By the time we completed our series of planned dives, my knee had assumed a pincushion proportion and had a persistent burning feeling. Surgery followed in a matter of days.

As I lay recuperating in the hospital, I had plenty of time to study the color transparencies of the photos that I had taken. The film did the fluorescent panels no justice. True, they did show the glowing quality of the fluorescent colors, but they didn't begin to capture the colors' brilliance. On one point, however, there was no disagreement: The lure manufacturers were correct in claiming that their lures' fluorescent colors would enhance their underwater visibility.

The scientific literature contains some excellent explanations of why these fluorescent colors persisted even at the great depths to which we took them. For example, oceanographers have suspended precision recording photometers at these depths and, later, using deep-submergence research vessels, have taken these instruments down far deeper than any diver could ever venture.

They found that clean oceans transmit visible light down to thousands of feet below the surface. Granted, at these tremendous depths you will no longer be able to read a newspaper, but photons of light do persist even in the apparently pitch-black marine world.

What happens is that, as visible light passes through the filtering medium of the ocean, the yardstick of wavelengths is progressively narrowed. Finally, the only wavelengths that persist are those in the blue-green frequencies. Substances and colorants that can be activated by energy in these wavelengths will respond, and visible fluorescent colorants fall within this category.

In earlier underwater tests, our studies were confined to observing and photographing fluorescent versus non-fluorescent painted surfaces. Now the time had come to expand our studies to include the nylon monofilament fishing lines. In these products, the manufacturers do not apply paints to their surfaces. Rather, they incorporate colorants directly into the molten nylon at the time they are forming the monofilament fishing line. Different types of fluorescent and non-fluorescent colorants are available for such incorporation. The question now was: Do these fluorescent and non-fluorescent systems behave in the same way underwater as the painted surfaces?

I rigged up an aluminum-tubing frame in the shape of a rectangle and strung single strands of different-colored nylon monofilaments across it. This "banjo frame" apparatus permitted me to organize and photograph a variety of different-colored lines underwater under varying circumstances.

By now I had learned that there were negligible differences in color behavior between freshwater and saltwater test sites. What was most important, from a photographic standpoint, was that I had to conduct this research in areas offering at least five to 10 feet of underwater visibility, with test sites in the 60-foot-or-more visibility range being better yet.

Before starting this phase of my testing, I checked a wide variety of nylon monos under black light to verify which ones were fluorescent. There are no color standards within the line industry—some line labels do not advise that their brand of line contains fluorescent colorants. Generally, the lines that are labeled as high-visibility or fluorescent are truly fluorescent. These lines readily glowed under black light or daylight. But what would they do underwater?

My shallow-water testing ranged from the surface to 24-foot depths. In every instance, the fluorescent lines were easily seen and photographed underwater. They glowed in the water as readily as above and, when viewed underwater against backgrounds of contrasting colors, actually seemed to glow more intensely.

Trying to photograph a thin-diameter object such as a 20-pound-test fishing line is tough enough above water. Go underwater and the problem is compounded by diving restrictions, bulky camera housings, the lower-intensity light, and the dark background. To help solve these problems, I constructed 10x14-inch clear Plexiglas picture frames, across which I level-wound the various test lines. Now, instead of trying to photograph and record the behavior of a single .020-inch strand of line, I had a much larger target area. And by placing the picture frames in a three-sided aluminum frame painted a flat black, I had a support and a constant viewing background.

At depths down to 60 feet, the mono panels provided an excellent means of studying fluorescent versus non-fluorescent monos. By pairing these lines, with one level-wound over half the picture frame and another over the other half, I could rotate the frame and see how the two lines reacted to the same light striking their surfaces. The fluorescent lines exhibited a pronounced "directionality," in which the glow was more readily apparent when the frame was rotated just a few degrees from this null angle. I have since found the same effect on single strands both above and underwater. Do not infer that these lines were intermittently glowing, then not glowing. They never stopped glowing, but the →

GRASSY LAKE OUTFITTERS
Licensed & Bonded Outfitter
Now booking for '85 & '86 Hunting Season.
ELK • DEER • BEAR • MOOSE
SHEEP • ANTELOPE
Summer Pack Trips in Yellowstone National Park. Fishing Trips on Rivers & High Mountain Lakes. Call or write:
BRYON J. WILSON
Box 853, Jackson, Wyoming 83001
(307) 733-6779

WYOMING'S OLD WEST OUTFITTERS
ELK • MOOSE • DEER • SHEEP • ANTELOPE
Trophy hunts from our wilderness and backcountry camps.
WILDERNESS SUMMER PACK & FISHING TRIPS
CAMERON GARNICK
Box 2788 • Jackson Hole, WY 83001
(307) 733-6994

JACKSON HOLE WALLHANGERS
Elk - Deer - Bear - Moose - Quality Hunts by the Trophy Specialists. Write for video tape of the hunt. **Maury Jones Jackson Hole Country Outfitters, Box 200102 Jackson, WY 83001 Call "Jonesie" at (307) 883-2999**

HUNT WYOMING

ELK • SHEEP
BEAR • MOOSE
DEER • COUGAR
ANTELOPE • FISHING
- Bridger Wilderness (Wind River Range) Pack in & Ranch Camps for Trophy Elk • Deer • Moose • Sheep.
- 1,000,000 Acre Private Ranch Hunts for Antelope, Deer & Turkey.
- Bow Hunters, Muzzleloaders—Hand Gun special hunts.
- Top Hunter Success
- Above Average License Drawing Success

FALL CREEK OUTFITTERS
P.O. Box 52 • Cora, Wyoming 82925
Mike (801) 224-6497 • Reed (307) 787-6764
If you write & give a phone # we will call you.
Application Deadline Jan. 31 for Elk, All others March 15.
Don't be disappointed. Book early with a Quality Outfitter.

ANTELOPE SPECIALIST
100% draw—100% success most years.
Also sheep, deer, elk, bear, moose. Near 100% most years. Trophy & regular hunts camp or mote. First class 28 yrs. experience. Family operated. Lic. deadline ELK—Feb. 1 all others March 15. Summer pack trips.
DICK & BRAD ULLERY
Box 1218, Casper, Wy. 82602 Ph. TOLL FREE
1-800-235-5453 or 1-307-235-5453

JACKSON HOLE TROPHY HUNTS
Now Booking: Guided Elk, Deer, Moose & Bear (Spring & Fall) Hunts for the 1985 Seasons.
Specializing in Trophy Mule Deer. Comfortable Pack-In Tent Camps in the Targhee National Forest. References furnished upon Request.
INDIAN CREEK OUTFITTERS
P.O. Box 2375, Jackson, Wyoming 83001
Tom Laughlin Licensed Outfitters & Guides **Bruce Moyer**
(307) 733-8409 (307) 733-9207
"We're building a reputation, not resting on one."

WILDERNESS VACATION ON HORSEBACK
Into remote areas of the Teton Wilderness and Yellowstone park. A wilderness experience that will be treasured forever. Write for Information to **Pack trips, Box K Ranch Moran, Wyo 83013 Ph. 307-543-2407**

WYOMING TROPHY HUNTS
Antelope, Deer, Elk, Sheep, Spring Bear & Moose. Hunts from late August thru November. Horseback and 4 × 4 Hunts for single Animals and combination hunts. 100% Success most years, summer fishing trips also available. Write or call for brochure, license applications & references.
S & S OUTFITTERS & GUIDE SERVICE
1818-0 S. Washington, Casper, Wyoming 82601
(307) 266-4229

WYOMING HUNTS
ELK–DEER–ANTELOPE–LION–BEAR
Horseback and 4 × 4 hunts on private ranch land and national forest in the Big Horn Mountains. Hounds used for Lion. Spring and fall Bear hunts. Great food. Experienced guides.
DULL KNIFE HUNTING, KEN GRAVES
Barnum Rt., Kaycee, WY 82639
(307) 738-2247
Licensed Outfitter & Guide

DENNY HUFF
LICENSED OUTFITTERS & GUIDES
P.O. BOX 1427 LANDER, WY. 82520
PH: 307-332-3249
WYOMING TROPHY HUNTS
ELK-DEER-BEAR-MOOSE-SHEEP-ANTELOPE
SPECIALIZING IN TROPHY HUNTS
IN TOP TROPHY AREAS
SUMMER PACK TRIPS & FISHING TRIPS
48 YEARS COMBINED EXPERIENCE

Bear Track Outfitters
Elk, Deer, Antelope, Sheep, Moose, Spring Bear, Wild Turkey. Hunt Wyoming's famous Big Horn Mountain & surrounding ranch land, or Jackson Hole for bugling Elk. Horseback, pack-in hunts & 4 × 4 ranch hunts. Quality hunts & 1st class accommodations for discriminating sportsmen. 307—684-5464
Ron & Pete Dube
RR 1, Box 95
Buffalo, Wy. 82834

OPEN CREEK OUTFITTING
GUIDED ELK HUNTS
Hunt the remote Thorofare Region next to Yellowstone Park.
SUMMER PACK & FISHING TRIPS
JOHN R. BILLINGS, Outfitter
P.O. Box 3199, Jackson, WY 83001
Phone: (307) 733-7924


WYOMING TROPHY HUNTS
Three Camps To Choose From
AFTON • JACKSON • COKEVILLE
ELK • DEER • ANTELOPE • MOOSE • SPRING BEAR
Sept., Oct., Nov.
WOLF MOUNTAIN OUTFITTERS
Guy & Debbie Azevedo
Route 1 • Afton, Wyoming 83110
(307) 886-9317
Formerly - Everett Peterson Hunting Camps

WYOMING ANTELOPE, DEER ELK, MOOSE, SHEEP & GOAT HUNTS
Aug. 23-Nov. 31. The finest hunting in central Wyoming & Northwest Wilderness Areas. We hunt all of the areas in central Wyo. Better than average & Trophy hunts. Licenses by drawing. Deadlines - Elk - Feb. 1. Deer, Antelope, Moose, Sheep & Goat - March 15. Excellent Guides. Fine accommodations available. Summer fishing trips, spring bear hunts. Will send brochure, Applications & References upon request. 100% Success most years. 26 years experience.
DICK PAGE INC.
1625 Holly, Casper, Wyo. 82604
Phone 307-237-7866
Experienced-Licensed-Outfitter & Guide

SWEETWATER OUTFITTERS®
• WAPITI • MULE DEER • PRONGHORNS
Top Quality hunts for the serious archer & rifleman. High success rate on all species, 100% shooting. All hunts backed by written contracts. We are continually striving to build on our already fine reputation not resting on it. North American Hunting Club approved. Early deadlines. Call or write today for brochures & references.
RAY DENNIS, LICENSED OUTFITTER & GUIDE
P.O. Box 4188, Casper Wyo. 82604
Bonded **Phone: (307) 266-1424** ***Insured***

RECORD BOOK ANTELOPE HUNTS SC! 100% SUCCESS KILL AND DRAWING!
Central Wyoming! The Center of **Big Buck** Country! Trophy Camp Hunts or Economy Town Hunts. All indoor camp facilities. No Tents! **Now Booking!** For **Free** brochure write or call Now! Antelope & Deer & Combination Deer & Antelope.
Harold Ullery
Outfitter & Guides • The Best in the West!
Box 9680, Casper, WY 82609
Tel. (307) 265-9051

WYOMING
ANTELOPE, DEER, ELK, SHEEP AND MOOSE
3 and 4 Day Antelope or Deer, 7 and 10 Day Elk, Both Regular and Trophy Hunts.
7 Day Moose Hunts and 10 Day Sheep Hunts.
All licenses issued on a drawing beginning Jan. 1.
Will assist in filing applications.
References and Brochures upon request.
Experienced Guides and Good Camps.
BOYSEN OUTFITTERS
Bud Weaver and Sons, Box 66
Shoshoni, Wyoming 82649
(307) 876-2636
Not the biggest, but certainly one of the best.

BOX Y HUNTING LODGE for Wyoming Trophies.
ELK • DEER • MOOSE • ANTELOPE • BEAR
5—10 Day Hunts, Solo Hunts, Archery Hunts, Combination Hunts, Spring & Fall Bear, Lake & Stream Fishing. For more information & Brochure Contact:
KEN CLARK, OUTFITTER
Route 1, Afton, Wyoming 83110
Phone: (307) 886-5459

BUD NELSON'S BIG GAME OUTFITTERS & GUIDES
P.O. Box 409L
Jackson, Wyoming 83001
(307) 733-2843
Hunt from Base and Back Country camps for Elk, Deer, Moose, Sheep in Teton Wilderness Area. Antelope hunts in Big Piney area. Summer pack trips, fishing & photographic. Write or call for brochure, applications, and deadlines.

WYOMING HUNTS
ELK • DEER • MOOSE • ANTELOPE • BEAR
For the best hunts of the season, plan you hunts now for 1985 & 1986 with ASTLE HUNTING CAMP, located in some of Wyoming's most choice hunting areas. Our camp is in the Targhee National Forest. Hunting from Sept. thru Nov. All applications on a drawing. Write or phone now for information:
Boyd F. Astle or June Astle
Box 121, Bedford, WY 83112
(307) 883-2750
Member of Wyoming's Outfitter Association

- **Jackson Hole Trophy Hunting**
- Elk • Deer • Moose • Mtn Sheep • Spring Bear
- Pack-In Camps in remote areas of Teton Forest and Wilderness
- Limited amount of hunters in Camp.
- 20 years same area

Roy & Linda Bonner
ARIZONA CREEK HUNTING CAMP
Box 716 • Jackson Hole, WY 83001
phone: (307) 733-3129

WYOMING HUNTS
Antelope & Deer Hunting
In Central Wyoming. Licensed Guides & Outfitter. Seasons in Sept. & Oct.
CJ OUTFITTER & GUIDE
1010 So. Washington
Casper, Wyo. 82601
John Dye **307-235-1975**


TROPHY ANTELOPE
We specialize in Antelope Hunts *exclusively*. If a serious Antelope hunt is your aim, then contact me for further information and/or my free brochure. Deadline for drawing is March 1, 1985.
DON (TIP) TIPTON
LICENSED OUTFITTER & GUIDE
2065 Prairie Lane
Bar Nunn, Wyoming 82601
(307) 237-4032

WYOMING. Hunt Elk, Sheep, Deer, Bear, Antelope, Moose & Goat Sept. thru Nov. Summer Fishing Trips July thru Aug. 18 years experience in same area. Write: **JOHNSON OUTFITTING, Box 1535, Cody, WY 82414. (307) 587-4072.**

HIDDEN VALLEY RANCH HVR
ELK✲DEER✲ANTELOPE✲SHEEP
Quality Trophy Hunts from Ranch or Wilderness Camp. We also operate a Summer Guest Ranch with Fishing and Pack Trips. Contact:
Duaine & Sheila Hagen
153 Hidden Valley Rd., Cody, WY 82414
(307) 587-5090

BIG SANDY LODGE
QUALITY GUIDED HUNTS • WIND RIVER RANGE
BRIDGER NATIONAL FOREST & WILDERNESS AREA
ELK • MOOSE • ANTELOPE • DEER • SHEEP
LOG CABINS • HOME STYLE MEALS • HORSES
SUMMER PACK TRIPS • TROUT & GRAYLING FISHING
BERNIE KELLY
BOX 223-OL BOULDER, WY 82923

MONTANA'S
Bob Marshall Wilderness Combination Hunts
ELK, DEER, BLACK & GRIZZLY BEAR, GOAT & FISHING
Comfortable Base Camp on the South Fork of the Flathead River. Scenic Summer Packtrips—Fishing, Riding, Photography. Please include phone # with inquiries.
WILDERNESS COUNTRY OUTFITTER
Frank & Gerri DeLeo, (403) 793-5702
Star Rt., Box 423, Greenough, MT 59836

MONTANA
Hunt the magnificent Absaroka Beartooth Wilderness north of Yellowstone National Park
ELK • DEER • MOOSE • BEAR • GOAT—Sept. - Nov. Special early Sept - Oct bugling & either sex Elk, Mule Deer & Bear Combo Hunt. Spring Bear Hunts. Float & backcountry fishing. Summer wilderness pack trips. Backpacking & photography trips into Absaroka Wilderness & Yellowstone Park.
ABSAROKA OUTFITTERS—Vern Smith
Box 5038 A, Bozeman, MT 59715
(406) 586-4065

BABCOCK CREEK OUTFITTING
Bob Marshall Wilderness

Big Game Hunting
Elk, Bear & Deer
Drop Floats
LEROY BOOKS Kalispell, MT 59901
P.O. BOX 1564 (406)752-3329

WILDERNESS LODGE
EXCELLENT ELK, DEER, BEAR & LION HUNTING

Fishing & Sightseeing Trips.
Cabinet Mountain Wilderness Area.
Montana Area 121 Idaho Unit 4
PROFESSIONAL OUTFITTERS & Guides Training Employment Guaranteed
Please include telephone # with inquiry
Rick & Terri Vander Meyden,
Rt. 2, Box 41 • Heron, Mt. 59844
Ph: 406-847-2277

MONTANA VACATIONS
Enjoy a vacation in the beautiful Boulder River Valley of Montana's Rocky Mountain Grandeur. Located just north of Yellowstone National Park and surrounded by the Absaroka–Beartooth Wilderness. Trout Fishing, Horseback riding, River floats and many more activities for the entire family or group. For more information write:
THE HAWLEY MTN. GUEST RANCH, Box 4-O
McLeod, Montana 59052 (406) 932-5791
Bill Jarrett, Licensed Outfitter & Operator
Big Game Hunts during Season
(Airport pick-up Service Provided)

RIFLE HUNT ARCHERY MONTANA
For Elk, Deer & Black Bear, also Moose. Sheep and Goat on a drawing.
Over 50% Kill on Elk for the past 21 years.
Pack-in or Base Camp Hunts.
TOM VILLENEUVE
P.O. Box 393 • Anaconda, Montana 59711
Phone: (406) 563-8081

BE A BIG GAME OUTFITTER or GUIDE
Go into Business for Yourself!
Be taught by the oldest, most reliable school of this kind in the U.S.A. Learn-by-Doing. All-Resident Training, Placement Service. Approved for Veterans. M.D.T.A. Approved Minimum age, 18 years. *Write or telephone 406-363-3522.*
THE ERV MALNARICH PROFESSIONAL OUTFITTERS & GUIDES SCHOOL
Post Office Box 493-B, Hamilton, Montana 59840

TROPHY MONTANA ELK
Trophy and Record Class ELK, Black Bear or Cinnamon Bear—pack in Fish & Photo trips—Combination ELK—Deer—Cougar hunts available. Exclusive Ranch leases now available for Record Book Whitetail, ELK & Bear. We specialize in gun & archery Hunts. Total satisfaction has been our goal for 20 years. Please book early for preferred dates. 17,000 Licenses available April 1, 1985, please apply early. For information or free brochure write or call:
BILL HILL Member M.O.G.A. **EDNA HILL**
BOX 1471 **BOX 1442**
TROUT CREEK, MT 59874 **TROUT CREEK, MT 59874**
Ph. 406-827-3694 **Ph. 406-847-2252**

OUTFITTERS & GUIDES SCHOOL
NORTHWESTERN O.G.C. SCHOOL
REWARDING OUTDOOR CAREER IN JUST 6 WEEKS
Most comprehensive class & field training by the top professionals
Certified diploma and free placement service to graduates
992 OL PLEASANT VIEW DRIVE
Victor, MT 59875 · PH (406) 642-3262

BEARTOOTH PLATEAU OUTFITTERS & GUIDE SERVICE
Hunt & Fish in Montana's Absoroka—Beartooth Wilderness Area, which lies along the North border of Yellowstone Park. **ELK • DEER • BEAR • SHEEP • GOAT • MOOSE** Sept. - Oct. "Early Bugling Season" Either sex Elk, Deer, Bear Rifle Combo. Oct. - Nov. "General Season" Elk, Deer, Bear Combo. April - May "Spring Bear." Summer Fishing & Pack Trips.

Ronnie L. Wright
Box 28, Roberts, MT 59070 Phone (406)445-2293
Licensed and Insured

DISCOVER MONTANA
Hunt the Absaroka Beartooth Wilderness
Come hunt big game with us. We book hunts for deer, elk moose and bear. Special hunts for sheep and goats. We also book scenic wilderness trips for the whole family in the summer. July-Sept.
O' HANG 'N TREE GUIDE SERVICE
Sherri Russell-Box 553
Absarokee, Mont. 59001
Phone No. (406) 328-8408

angle at which the line was viewed underwater could be deceiving.

It was during one of these saltwater line-test sessions, where the water was both clear and deep, that I made an unexpected discovery. My partner and I were working down in the Florida Keys, using both the color-spectrum panels and the picture frames. I had to return to the boat to get a second camera and, as I swam back down to my partner, I could see the color panel approximately 100 feet away. I thought that my eyes were playing tricks; the fluorescent chartreuse section was easy to spot, but all of the other colors appeared dull and color-shifted. As I continued to swim closer, I noticed that the fluorescent colors were returning to their expected, glowing color quality. There was no apparent change in the non-fluorescent colors; at the 40-foot depth we were working at, they had already shifted.

I repeated the test and got the same result. The glowing quality of the fluorescent colors was "soaked up" as it traveled the horizontal distance to my eyes. The light being reflected from the spectrum panel was being absorbed by the horizontal column of water between me and the panel. When I approached within a 10-foot range of the panel, all of the fluorescent colors again resumed their above-water appearance. When I traveled beyond this range, they gradually deteriorated in brightness, then began shifting. The glowing reds became black, the bright yellows turned white.

I reasoned that, if this shift took place at a 40-foot depth, it should also occur at any depth, including very shallow fishing depths. To check this, we set up a test course in both fresh water and salt water, marking off the horizontal viewing distance through which the reflected light had to travel to the viewer's eye.

Next, I took fluorescent lines, attached them to bright fluorescent-orange lures, and secured these between sunken logs. Backing off approximately 100 feet from the lures and lines, I was unable to see the lines and could barely make out the tiny dots of the lures in the crystal-clear water. As I began swimming toward the lures and lines, their color and visibility started changing. At the 50-foot mark, I could easily spot the lures but, rather than bright orange, they were a dark chocolate brown; I still could not see the lines. At the 15 to 20-foot range, the lures shifted back to bright orange, while the lines were visible as faint, thin-blue threads. At 10 feet the lines were highly visible and actually seemed to be much larger in diameter, as if surrounded by a glowing halo of light.

Now imagine the following situation: A fisherman rigs up a fluorescent-red-colored lure and begins to work reasonably clear water. He makes a perfect cast and can actually see the bass heading toward the lure. About 10 feet away, the fish shows up and then stops abruptly, and, for no apparent reason, at the five-foot range, it suddenly veers off and disappears. Could the lure have looked black when the bass spotted it, attracted by the lure's action, and then have shown its true fluorescent-red color as the bass moved in, senses alert to the fact that something unnatural was happening? The bass' survival instincts gave it some warning that made it refuse to strike.

I have seen this scenario reenacted hundreds of times. In clear water, with a slow-speed retrieve, I suspect that fluorescent-colored lures impose a definite handicap. As a diver swimming toward such lures, I consistently saw them abruptly shift from dull to bright, glowing colors. The natural baitfish that live underwater just don't exhibit that behavior.

In this regard, non-fluorescent lures fished slowly at depths below 10 feet don't trigger abrupt color shifts; they simply turn black and, no matter how far away from them you are, they stay black. The only way you can see the true color of such a lure is to take it back up into shallow water.

Sometimes, though, when the right combinations of fluorescent and non-fluorescent colors are used, they can prove extremely effective—and provoke really huge fish to strike.

MT. STATES—U.S.A.

JACK ATCHESON & SONS INC, Hunting Consultants
Dept O, Butte, Montana 59701 • (406) 782-3498, 3470, 3445
30 Years experience: AFRICA•CANADA•MONGOLIA•WESTERN STATES
Watch future isssue for stories, Carmichel & Atcheson Hunting
Africa•Canada•Alaska

ELK DEER
GUIDED TROPHY HUNTS
Hunt Unit 17 of Selway Bitterroot Wilderness Area of Idaho. For more information write or call:
GERALD RICHIE & SONS OUTFITTERS
Star Route, Darby, Montana 59829
Phone: (406) 349-2499
Over 35 years in the Outfitting Business
SPRING BEAR LION

Personalized Selway-Bitterroot Wilderness Trophy Hunts. 8 or 10 Day Trophy Elk Hunts. Completely Furnished Camp in Remote Area with Your Own Experienced Guide.
PROFESSIONAL OUTDOORMAN CAREER SCHOOL Specialized Co-ed Training in the Knowledge & Skills Necessary to Begin a Career as a Professional Guide, Packer or Wrangler. Free Placement Service to Qualified Graduates. (Credits obtainable from Univ. of Idaho)
FISHING High Mountain Lakes and Streams, July/August.
"Wally" YORK & SON, Inc.
1982 Golden Year of Outfitting
PO Box 319-OD, Elk City, Idaho 83525 (208)842-2367
Licensed & Bonded Outfitters & Guides

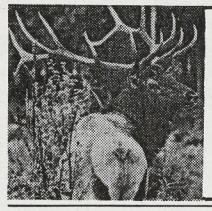
TROPHY MULE DEER
FORT PECK, MONTANA
SKYLINE GUIDE SERVICE
100% Success
Experienced Outfitter & Guides
1,700 miles remote Shoreline
Hunt from Boats & 4 Wheel Drives
Box 27•Belfry, MT 59008•(406) 664-2503
Box 1074•Cooke City, MT 59020•(406) 838-2380

MONTANA
Combination Hunts
ELK • DEER • BLACK BEAR
MOUNTAIN GOAT • GRIZZLY
8 and 10 Day Guided Hunts
CURTISS OUTFITTERS
326 Bench Dr., R.R. 4, Kalispell, MT 59901
Phone: (406) 257-6215

Hunt Idaho's Backcountry
Stay at
RAMSHORN RANCH
H/C 82, Box 4051 Challis, Idaho 83226
Call (208) 879-2372
Non-Guided, Non-Outfitted Hunts only.
Now taking reservations for the 1985-86 season.
SEPT.-NOV.
- *Combined deer, elk and bear hunts*
- *7 day, non-guided hunts*
- *pack horses provided*
- *stay in family-owned lodge*
- *hot, family-style meals provided.*

BIG SKY GUIDE & OUTFITTERS, INC.
ELK·DEER·BEAR·SHEEP·ANTELOPE·GOAT·MOOSE
10 day Elk Deer Bear Comb. $700. 10 day sheep bear comb. $750. Spring Bear $750. Wilderness area pack trips $250. Montana state accredited guide school, full tuition $1000. Grads 100% employed in '84. Summer family cabins, trail rides. Excellent trout fishing, float trips. Bow hunters 50% discount. Private ranches & Forest service. 46 years same area. Why settle for less? Bro. & Ref.
WILSALL, MONTANA 59086 • 406-578-2270
TOM BROGAN

BULLSEYE!
HUNT MONTANA'S FINEST
Northern Yellowstone Herd.
TED E. DINSDALE
Star Route
Roberts, MT 59070
(406) 445-2205



Idaho Selway Bitterroot Wilderness Area
COOLWATER RANCH
SPORTS AND RECREATION IS OUR BUSINESS!
Big Game Hunting: Elk, Deer, Bear, Cougar
Fishing Trips, Camping, Trail Rides, Photo Trips, Pack School
Units 12–16–17
DON WILSON
HCR#1, Kooskia, Idaho 83539
(208) 926-4707 or (406) 745-3188
Licensed & Bonded

WILDERNESS MONTANA
Enjoy excellent Elk, Deer & Bear Hunting within walking distance or a short drive from our ranch. We are located adjacent to largest Wilderness Area in the continental U.S.A. (Selway/Bitterroot). Luxurious fully-furnished log cottages. Weekly rate from $186.25 per person/minimum of four.
Phone (216) 493-8550 for return of call or write:
ALTA RANCH (OL)
West Fork Stage, Darby, MT 59829

MONTANA BULL ELK
SPRING BEAR—TROPHY MULE DEER.
Sept. Archery Hunts — Remote Camps.
BOB ZIKAN SR., Box 555-O, Conner, MT 59827.
(406) 821-4541 or (406) 549-4825

EPLEY'S IDAHO OUTDOOR ADVENTURES
- Spring Bear Hunts - Fall Hunts for Elk, Deer, Bear.
- Steelhead Fishing - Summer Pack Trips - Horse Rentals Hourly
- Salmon River White Water Float Trips

Ted Epley • (208) 634-5173
P.O. Box 987 ODL, McCall, Idaho 83638
EPLEY'S GUIDE SCHOOL
Learn to be an Outfitter or Guide. Courses from 2 weeks thru 6 weeks for: Whitewater River Guides • Big Game Packer • Big Game Hunting Guide • Taught by Professionals.
"You Deserve The Personal Touch—Go With EPLEY'S"

IDAHO ELK HUNTS
River of No Return Wilderness
CHAMBERLAIN BASIN OUTFITTERS
≈Fly in Only≈
Comb. Bull Elk • Deer • Bear—Sept.—Nov.
★ We hunt for mature 6pt. Bulls ★
Small Parties 1st Class Camps & Food
ED & PEGGY McCALLUM
Rt. 1, Box 240AO, Salmon, Idaho 83467
Serious hunters please call
(208)756-3715

Northeast Montana Deer & Antelope Hunting.
BILLINGSLEY RANCH OUTFITTER & GUIDE - (406) 367-5577 Box 768, Tampico Rt, Glasgow, MT 59230
Member Montana Outfitter & Guide Assn.

BOB MARSHALL WILDERNESS RANCH
How's 4 Bulls & A Bear in 4 years?" Wilderness Trophy Hunts— Elk, Deer, Goat & Grizzly Bear Summer Pack Trips. Unequaled Fishing. Spring Bear Hunts.
Virgil Burns, Licensed Outfitter
Bob Marshall Wilderness Ranch
Seely Lake, MT 59868
Winter Ph. (406) 745-4466 Summer 754-2285

BARTLETT CREEK OUTFITTERS
Hunt & Fish with us in Montana's Beautiful Bob Marshall Wilderness Area
Hunting Trips Sept. 4 - Nov. 6 for
Elk-Deer-Goat-Bear (Black & Grizzly)
Bow—Rifle—Black Powder
Fishing & Scenic Trips July & August
For information or brochure write or call:
MIKE SMITH
Rt. 1 Box 30-2, Ronan, MT 59864
Phone: (406) 676-5088
Licensed Outfitter & Guides

G & L YORK'S OUTFITTERS & GUIDES, Inc.
36 Years Experience. Hunt Idaho's Salmon River of No Return Wilderness Area Unit 20, 35 miles from Elk City. If you have hunted unsuccessfully for that trophy Bull Elk, it's time to try us. We can guarantee a good shot at a 6 pt. Bull Elk. Access by horses & mule only.

Licensed & Bonded Outfitters & Guides
Rt. 1 Box 98R, Lenore, ID 83541
Dec. thru June Ph. (208) 836-5756
July thru Nov. (208) 842-2316

Now Booking 1985 Spring Bear Hunts, Summer Vacations, Fall Big Game Hunts. Over 30 years in business
TRIANGLE C RANCH, North Fork, Idaho 83466. Phone: (208) 865-2422

SELWAY BITTERROOT WILDERNESS AREA
TROPHY BULL ELK, MULE or WHITE TAIL DEER, BLACK BEAR, COUGAR. We hunt the Moose Creek Drainages in the heart of the Wilderness, Unit 17. Fly-in only Deluxe trophy Bull Elk, combination Bull Elk, Deer, Bear hunts. (2 bear area) Spring Black Bear, Largest Bear population in state. Summer pack trips for Fishing, trail rides, photography or just plain relaxing at our base camp. July thru Aug. Family rates. We are now booking for 1984 and 1985.
MOOSE CREEK OUTFITTERS
P.O. BOX 1181-O, Orofino, Idaho 83544
Phone 208-476-5227

Drop Camps. Unit 17 of the Selway Bitterroot Wilderness Area of Idaho. Completely Furnished. For more information Contact:
GERALD RICHIE & SONS OUTFITTERS, Star Route, Darby, Montana 59829 (406) 349-2499

WILDERNESS GUIDE SCHOOL
Learn the guiding profession from the experienced. Learn to guide for big game, fishing and photography trips. School starts June 4, 1985. Free job placement. Approved for V.A. Benefits.
GARRY MERRITT
Box 1516-O
Salmon, Idaho 83467
(208) 756-2850

RIVER OF NO RETURN WILDERNESS SCHOOL
OUTFITTER * GUIDE * CAMP COOK
Coed—3 students per licensed instructor
Four weeks professional training in our largest wilderness
Free job placement—approved for VA benefits
Family owned & operated—Ed & Peggy McCallum
CHAMBERLAIN BASIN OUTFITTERS
Rt. 1, Box 240AO, Salmon, ID 83467 208-756-3715

TRIPLE TREE RANCH
ELK·DEER
406 587-4821
5520 Sourdough Rd. Bozeman, MT 59715

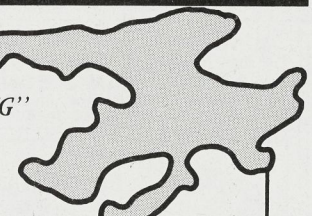
LITTLE BELT MOUNTAINS
ELK — DEER
Guided and unguided hunts from tent camps or the ranch headquarters. Bow hunting. Summer vacations are also available.
CIRCLE BAR GUEST RANCH
UTICA, MT 59452
406-423-5454

HUNT & FISH
In Heart of Bob Marshall Wilderness and Mission Mt. Wilderness Areas.
ELK, DEER, GOAT, BEAR—(Grizzly and Black).
Family business for 48 years. Ranch and Family Summer Vacations.
MICK & KAREN CHEFF
Licensed and Bonded Outfitter and Guide. Charlo, Montana 59824 Phone (406) 644-2557.
Members of Montana Professional Outfitters Assoc.

MONTANA
Hunt ELK, DEER, MOOSE, GOAT & BEAR in the rugged and beautiful Selway Bitterroot Wilderness area and Sapphire Mountain Range. Everything furnished except licenses and personal gear. For more information Write:
BILL MITCHELL
S.E. 388 McCarthy Lopp
Hamilton, Montana 59840
(406) 363-4129

N. W. TERRITORY

GREAT BEAR LAKE
"WORLD'S FINEST TROPHY FISHING"
Lake Trout • Arctic Grayling
Lake Whitefish • Northern Pike
Flyouts for Arctic Char



Each Lodge offers excellent accommodation, experienced guides, side trips, exquisite cuisine, 8 day fishing trips.
FOR YOUR COLOR BROCHURE WRITE OR CALL:

PLUMMERS GREAT BEAR LAKE LODGE
1110 Sanford Street,
WINNIPEG, MAN. R3E 2Z9
Ph. (204) 774-5775

GREAT BEAR LODGE
218, 707 - East 41 Street
SIOUX FALLS, S.D. 57105 USA
Ph. (605) 336-2008

GREAT BEAR TROPHY LODGE
Hangar 2, Mobile 3
Saskatoon Airport
SASKATOON, SASK S7L 5X4
(306) 244-9800

BRANSON'S LODGE
(same owner-new address)
P.O. Box 2600
SPRUCE GROVE, ALTA. T0E 2C0
Ph. (403) 962-6363

ARCTIC CIRCLE LODGE
Box 231, ST. ALBERT, ALTA. T8N 2N3
Ph. (403) 458-3383 or 435-6882

SASKATCHEWAN

FLY-IN BLACK BEAR ISLAND LAKE LODGE FLY-IN
Fishing: Northern Pike, Walleye, Lake Trout
Hunting: Black Bear, Moose, Woodland Caribou
Reservations and Free Brochure,
Call or Write:
107 Wells Street, Regina, Saskatchewan, Canada S4R 6J2 · Phone: (306) 543-2187

C·A·N·A·D·A

Fish the **BIG WALLEYE** in unspoiled beauty. Complete Fishing facilities. Private, no crowds. Family, extended stay rates. Where the Big Ones Bite!
PICKEREL BAY CABINS
P.O. Box 337, La Ronge, Saskatchewan, Canada S0J 1L0
Phone: La Ronge Mobile JJ33045

SPORTSMEN'S ADVENTURES IN BOOKING AGENCY
TRY OUR FREE SERVICES- You'll Be Glad You Did!
We have dozens of packages covering the finest lodges in Saskatchewan and the North West Territories. Fly-In or Drive-In Fishing; Bear and Goose Hunting. Ask for our Large Brochure.
SPORTSMEN'S ADVENTURES, INC.
94 Empress Dr., Regina, Sask. S4T 6M6
Phone: (306) 522-6381

see through a layer of water.

We have also to consider the question, which I have raised before in *Trout and Salmon*, of the possible value of exaggeration of colours in artificial flies, If, as I think is possible, the key colours really exist, it may be advantageous to exaggerate them, as indeed we do in some patterns by using fluorescent materials, or by concentrating colours that may exist only as components of the colour of the real insects, in one area only of the artificial, separate from the other colours or pigments with which, in the real insects, they are mixed or associated.

Speculation, you may say, all of it, and so it is, but it is speculation not entirely unsupported by evidence and observation, and it makes a much more interesting basis for designing artificial flies than pure guesswork or even attempts to match natural insects without considering all the possibilities that are open to us.

yup.

Roll-casting a dry fly

It's a tactic of 'jungle warfare' says PAT RUSSELL

An angler roll-casts on a Yorkshire chalk-stream.

NORMAN SIMMONDS' article on roll-casting (October 1979) was of interest, but on one point he fell into that pitfall of writers of implying "never" or "always". With fishing in particular, dogmatic statements invite views to the contrary, and here is one such contrary view for those who may have taken to heart Norman's point that roll-casting for dry-fly fishing is not feasible.

During the last few seasons I have been using the roll-cast more and more, and several instances of its success stand out clearly. Along my favourite beat, the stream divides into three. The eastern carrier is not normally stocked as it makes a fairly effective barrier to poachers and adventurous small boys. Trout do appear in this carrier, however, and they were there in larger numbers than usual in 1978, when a few hundred small rainbows found their way there from a new fish-farm close by.

Most years I make a sortie to investigate this water. It's an operation I refer to as "jungle warfare", and that about sums up the approach and position along the bank. Sometimes I take a pair of pruning shears to cut through the brambles, so you can imagine that any idea of a back-cast is out of the question. I take with me a small cane rod of 6 ft 3 in which Charles Carfrae, of River Dart fame, worked down from 3½ oz to 2½ oz. It is just right for the job in hand, which is to cover numerous rising fish only about 20 ft from the bank.

There is no way in which I can work an overhead or side-cast, but by gradually rolling out a dry Red Spinner I can pick up fish at various points. I stand the best chance when I can avoid rolling the leader over the fish. I can start the cast almost level with the fish without scaring them as there is so much cover behind to cut down shadow and mask my silhouette. By working the fly out so that the penultimate cast drops the fly a foot or so away from and behind the fish, I can make the final offer a couple of feet in front of the rise.

There must be thousands of fishermen who have caught trout on the dry fly by using a roll-cast, but it is pleasing to be able to demonstrate it. This was my good fortune while demonstrating the roll-cast to Romsey Fly Fishers. A fish rose close in to the opposite bank about five yards above and obliged by taking the fly at the end of my roll-cast.

Exactly a month earlier I had enjoyed a splendid day on the Itchen at Kingfisher Lodge. I had a number of fish and then, high up the beat I found about eight fish rising well, including three in the 3-4 lb range. From the right bank (looking upstream) my back-cast was soon dangerously near overhanging branches, and then it became caught in them. Climbing the offending branch brought evidence that others had been foiled in the same manner. A roll-cast was called for, but the best position was from the opposite bank if the largest fish was not to be lined.

A walk of one-third-of-a-mile was required, but I judged it worth it, and in due course my Parachute fly was rolling out further and further towards the heaviest fish. The first time the fly covered him he took and the 3 lb point ripped away. I checked him, but too quickly and cursed as the point broke. A month later I received a letter from Jake Thom, my host, and at the top was a Parachute fly I recognised with 9 in. of nylon. Jake had caught that fish a week later on a 4 lb point, a beautiful brown of 4 lb 11 oz.

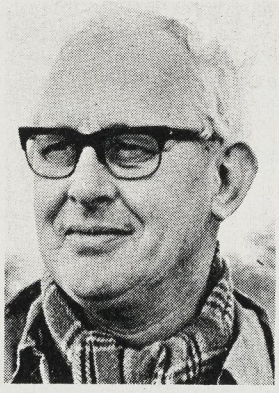
Another useful cast which can bring reward in certain circumstances is the bow cast. Consider a fish right in close to your bank shielded by sedges and overhanging branches. With not a lot of joy to be expected with an overhead or roll-cast, the bow-cast would be my tactic. To use this, crawl up close as possible to your fish, using any cover available, grasp the fly (whether dry or nymph) by the hook-bend, using thumb and forefinger and, taking good care that the hook-point is well clear of flesh, poke the rod through the sedges. Bow the rod by pulling the fly back, and release it under tension. The fly shoots out and if the aim is right you are in with your best chance with that first shot.

Many are the times I've used this "jungle-warfare" tactic to get at otherwise unapproachable fish. Stealth is usually most important, with 80 per cent of success due to presentation and 20 per cent due to the fly pattern.

In the last month of the 1979 season, while fishing a Test carrier near King's Somborne, I used both the roll-cast and the bow-cast on a large rainbow. The overhead cast could be used, but the fish became nervous after a couple of offers and moved further across the stream, so I moved up from behind until almost opposite, when I laid a few roll-casts with a Shrimp Fly over him. He moved across in a most determined manner and followed almost to my feet, but I missed the take.

Then he took up a position almost at my feet and any quick movement of the rod would surely frighten him. I bowed the 8 ft Hardy carbon rod and shot the Shrimp to the right spot. Again he rose, but sheered away at the last moment. A change of pattern was indicated, but with a minimum of movement as I was in full view.

A Mayfly nymph went out, the fish surged after it and I tightened, remembering that, like a fool, I had forgotten to change to a 6 lb point which this fish clearly required. After a considerable battle within the pool he took off downstream where, by good fortune, a wadered friend was able to net him. At 7½ lb that fish was a nice end-of-season bonus.



Why does a green 'crane-fly' work? asks RICHARD WALKER

Key colours for selective trout

I AM NOT of the persuasion that computers can solve all our problems, but there is one aspect of fly-fishing for trout in which the services of such a device, were it properly programmed, might prove valuable!

For many years, it has become more and more apparent that insects on which trout feed, often selectively, possess what might be called key colours. By that I mean that each species of insect possesses, by no means always obviously, a colour by which trout recognise it.

In the case of the *Ephemeridae,* there are useful examples. The key colour of the iron blue is crimson or magenta. That of the blue-winged olive is orange. That of the pale watery is primrose yellow. That of the olives is chestnut. That of the pond olive is a light orange or apricot colour.

Most of these insects display their key colours only in the body of the female imago or spinner. Nevertheless, there is reason to believe that by incorating material of the key colour in an imitation of the dun or sub-imago stage, the artificial can be made significantly more attractive.

Although he did not always practise what he preached, G. E. M. Skues seems to have been aware of what I have called key colours, and of their relationship, in ephemerid species, to the body colours of the spinners. Even when discussing nymph dressings, he writes ". . . it is well to study the underlying colour of the spinners of the natural insects of the same species, and to suggest that colour as the base colour of one's nymph by the use of appropriate tying silk."

Thus, his Iron Blue Nymph is tied with a body of mole's fur spun on crimson silk, and his Blue-winged Olive Nymph has a cow-hair body spun on hot-orange silk. He has an alternative in which orange silk is dubbed with green cat fur (blue Persian dyed in picric acid) is used.

The principle of including key colours is not confined to imitations of the *Ephemeridae.* It applies, I believe, to some, at least, of the sedges and to the crane-fly. For the caperer it is light orange or yellow; for the grannon it is green, as it is for the crane-fly. I discovered what seems to be the key colour for the latter only quite recently.

Let me make it clear that I am by no means suggesting that absence of the key colour from an imitative dressing will render it useless to attract trout. Many patterns designed to imitate particular kinds of insect lack these key colours, but they catch trout quite successfully. I go only as far as to suggest that the attraction of imitative patterns can often be enhanced by the use of key colours.

Let me offer some examples.

Lunn's Caperer has a band of yellow in the centre of its body. My own Red Sedge has the rear of its body made of arc-chrome fluorescent wool. Two of Pat Russell's flies have key colours. His Iron Blue has a little magenta at the rear of its body; but showing red tying silk at the rear of the body of the Iron Blue is an old trick.

Russell's Grannom, a very effective pattern, has a few turns of the right colour of green at the rear of the body.

☆ ☆ ☆

G. E. M. Skues discovered that the Orange Quill would catch trout when they are eating blue-winged olives. The Red Quill has always been regarded as a useful pattern when trout are eating olives. Lunn's Particular is often effective then, too, even when trout are eating the newly-hatched duns.

Some years ago, I devised an imitation of the pale watery family in which a few turns of primrose silk are exposed at both tail and head. Many anglers have been kind enough to praise this pattern.

As for the crane-fly, at least two anglers seem to have discovered quite independently of one another that trout prefer an artificial with a bright green body to the normal pattern in which the body matches approximately the earthy-brown colour of the real insect.

In the cases of the ephemerids, the key colour appears to relate to that of the female spinner and we might surmise that it is present also in the dun, under the skin. In the sedges, we may relate the key colour to the egg-ball the female insect carries; but it is hard to relate green to anything about the crane-fly. There is an insect, *Siphlonurus armatus,* one of the *Ephemeridae,* which is about the size of a crane-fly, and has a bright green body, but I have never seen it on any water other than Darwell, and I never saw a trout eat it or its nymph there, nor have I found it in stomach contents.

It seems to me that there is much scope for research and experiment in this matter; we know that fish can distinguish colours much as we can, and that they may be able to see farther into the infra-red, but we do not know exactly how colours appear to them, nor are we quite clear about the attenuation of colour by water of different depths and staining.

The possibility that I have never seen discussed is colour adaption. When as a boy I developed orthochromatic photographic plates and films in red light, I found that, when I left the darkroom, the sky and any other light objects appeared green, and this illusion persisted for some minutes. When I wind down my tinted car window, the sky at first appears pink. In a room lit by filament electric lamps, a sheet of white paper appears white, but a photograph which includes it, taken on daylight colour film, shows that it is really yellow, that is, it reflects yellow light.

A fish swimming below the surface is usually in a world lit by blue-green light, since reds and yellows are progressively attenuated by their passage through water, more rapidly than blues and greens. It seems possible that the eye of a fish adapted to this lighting, may persist in adaptation as do our own eyes, after the basic lighting has changed; and that will happen if the fish approaches the surface.

It seems possible, too, that what to us seems a plain colour is really made up points of pigment of many colours, as in the style of painting called Pointillism. If this is so, then colours may be either emphasised or attenuated by passing through water of greater or lesser depth, and consequently, there may be a considerable difference between the colour we appear to see and what the eye of a trout, adapted to a different quality of light, may

re Color
& The "prismatic" fly

perfectly stable for many years, and as we are almost peculiar among nations in not having lost a ship by the spontaneous combustion of her own powder, it is not too much to hope that the precautions now taken will avert any such calamity in our Navy.

This, so far as I can remember, is the gist of my lecture, and I can only hope that the criticism of my readers may be as kind as that accorded to me on the evening on which it was delivered.

DESMOND O'CALLAGHAN, President.

FROM THE FISHES' POINT OF VIEW.

OUR member, "Glanrhôs," is, I think, right; many fly-dressers, even when they go to Nature for their models, still fail to appreciate the point from which the fishes view the natural fly, and also the conditions under which they see it, this being especially the case with the makers of dry flies.

If asked what is the colour of a common house fly as seen by the fish, it is probable that the great majority of fly-dressers would unhesitatingly reply "Dark grey," and although this may approximate to the truth, from *our* point of view, if we consider the conditions and circumstances under which the house fly appears to the fish, the reply is probably "quite wrong."

Let us suppose that the conditions are bright sunshine and wind, and the fly floating on the surface. Viewed *from below* in sunshine the house fly is orange, black, and ochreous in colour, due to the light coming through it, and the wings are prismatic at almost any angle. When the fly alights on the water the hairs which clothe its body carry innumerable small air bubbles which float the fly lightly, but the consequent surface tension, reflection, and refraction of the water viewed from below, give an appearance of silver and gold around the fly, mingling with which is a strong suggestion of prismatic colouring, the colour scheme having a focus of interest in the silver and red of the eyes and head. The house fly is quoted simply as an example which can be readily obtained and the experiment verified with the minimum trouble.

So much for a dull coloured fly floating—but drown that fly, *i.e.*, thoroughly wet it so as to remove the small air bubbles from its surface, and look at it sideways instead of from below, and it at once assumes a sober colour, more like our usual conception of it. If this happens with a sober, solid fly like a house fly, how much more brilliant and beautiful do we find the *Ephemeridæ*, the gnats, and other flies whose bodies are almost transparent, and whose wings are

transparent glittering sheets of prismatic colours blended with gold and silver; and yet the fly-dresser attempts to imitate these with pale starling, blackbird, or other dull opaque feathers simply because his materials impose certain limitations, and again he fails to appreciate the fishes' point of view.

Viewed from above the usual feather imitation is approximately correct, but viewed from below on the surface of the water, particularly in strongish light, a good glassy hackle will give a far better suggestion of a spinner or gnat than any winged imitation ever can do. To take an analogy, Which is the more suggestive of Nature and the more pleasing—the laborious intricately detailed painting of a landscape, where every detail of herbage and foliage in the foreground and an elaborate middle distance are shown, or the broad, liberal rendering of the artist giving his interpretation and impression in simple masses of form and colour, repressing all except essentials? So with the fly-dresser the simple glassy hackle glittering in the sunshine and lightly impinging on the surface of the water when viewed from below gives a far more realistic impression than a heavy winged fly struggling to float with the aid of oil, where the hackled variety rides easily and buoyantly.

The effect of oiling a dry fly is to alter its refractive index, darken and sodden it to a remarkable extent so that it does not present a thousand little points to catch the light as it did before the application of oil, and this is another excellent reason why a hackle fly frequently scores when a winged imitation, oiled, fails.

There are, of course, great limitations imposed by the materials, and also the conditions of using them. To begin with, the bodies of all flies are tubular and allow a certain amount of light to pass through them, whereas the base of all artificial flies is of necessity a steel bar, excepting in the case of flies with detached or semi-detached bodies, Viewed from above, the quill body is as near Nature as possible, but from below it is almost black, unless there is light reflected from below, and although a rough, thick woolly body is an abomination, the fact cannot be overlooked that a coloured light comes through the edges of the wool which suggests a transparence entirely absent in the close hard quill body. Celluloid is transparent but shows the centre steel bar of the hook, and the only satisfactory way we know is to make the body with a basis of tinsel, and over this wind a band of gut, celluloid, indiarubber, mohair, or other material which will allow the sheen of the tinsel to show through in part, at any rate, suggesting transparence by means of reflection.

Flies with tinsel bodies are at times "most taking," as also those which have high colour in them. A finely dressed fly with turns of three hackles, red, yellow, and green in colour, with yellow and red spines for tails, and a gilt body, will on a brilliant hot day

kill in a surprising manner. On August 7th I tried various flies of the blue and green bottle variety, with fair success; they floated perfectly, and on hot days are "great medicine," but as the fish began to come short, and as the day had got brighter and hotter, I put up a "prismatic" fly, knowing its worth from experience, and the result abundantly justified the change. So long as the bright conditions held the prismatic fly worked "like a charm," but when it came on dull it ceased to be attractive, and a fly of sombre colour became more seductive.

It has been laid down in salmon fishing, "Bright day bright fly; dull day, dull fly," a rule which I have found work out also with trout. Should the weather turn thundery and dull a bright fly ceases to attract, and a black, brown, or ochreous one will do much better. In a diary extending over some years I find several entries to the effect, "as the day became dull and gloomy the bright fly ceased to attract; a change to a dull coloured one soon mended matters." It will be interesting to hear if other members have observed this fact. It has been averred that brackish or salt water has more tendency to produce prismatic colours and also to make objects in it glitter, and that is one reason why salmon, which are used to feed on small glittering fish, and prawns which are semi-transparent, and have long antennæ and many legs, which glitter and shine as they swim along, should be attracted by a gaudy imitation of we know not what. We watch the various crustaceæ and so on in a salt-water aquarium in sunshine and shadow with interest, and the way they change colour according to the light and shade is very suggestive and interesting.

The various reasons assigned by different philosophers or observers for fish taking a fly are curiosity, pugnacity, acquisitiveness, jealousy, and hunger. I would suggest that at any time it is possible to get a lot of rises from the first cause, by putting on a big fly or beetle in bright conditions, or even a salmon fly if it floats well. The trout will rise at it like fun, but not one in ten will be hooked: they are simply flirting with the unknown. Again, an abnormal fly put over the haunt of an old stager causes annoyance, and a splashy, pugnacious rise is the result.

If two good fish have their haunts near together they become exceedingly jealous, and one is certain to fall a victim of acquisitiveness or jealousy in the fear lest his neighbour gets there first. The second fish, after his neighbour's removal, becomes much more cautious, and will take ten times as much catching. My brother has shown me big fish in their lairs on several occasions, remarking that he had caught their mates weeks or months before, but the one left had developed into an artful old dodger, whereas before the two used to rush out at a fly simultaneously. His frequent remark is: Show me two fish and I will catch one of them, but the survivor will take even a

live bluebottle by the wing and shake it to see if there is a line attached. Lastly, the reason for taking a fly is hunger, though really I believe this is by far the most frequent cause, as is shown by the systematic way in which the rises of trout occur.

It is not reasonable to suppose that curiosity, or in fact anything but hunger, should strike trout at regular periods just synchronizing with the rise of natural insects morning and evening. Although the other passions may be called into play, the main cause of the angler's success must ever be hunger, and to achieve success the angler must always aim at such an imitation as is an exact counterpart of one fly, or else an artificial which is so typical in form and colour that it may be readily mistaken for at least "an insect"; in other words it is an artist's interpretation of the general or composite appearance of several insects, and if this is studied *from the fishes' point of view*, success will be steady and not the spasmodic success which follows more haphazard methods.

LEONARD WEST.

[Mr. West has sent us two of his prismatic flies, which he calls "West's Imago." We should describe them as similar in style to Mr. Halford's new pattern spinners, but dressed with tinsel bodies and *very* clear and glistening prismatic coloured hackles. The prismatic idea is suggestive, and we think good, and we have mounted the flies on a card and sent them to the Club for general inspection.—ED.]

SPORTING HAZARDS ON A BERKSHIRE BROOK.

THE drought of 1911 must live long in the memories of the members of the Club, and it may be that in the rough streams commonly known as wet-fly waters sport was at a standstill for months; but for those whom fate or fortune confine to waters within easy access of London, there was still sport to be had through the most blazing weather—and sport, at that, at times scarcely inferior to that to be had in more normal seasons. Yet it was with little hope of trout, though with a fixed determination to enjoy the lovely conditions of country and weather, that I descended the hill one mid-September day into the Berkshire valley, traversed by one of the most exquisite wilding brooks in the country side. If the banks are tangled with a wild profusion of bramble and thorn, willow herb and mullein; if wild cherry, hazel, ash are interspersed with alder and willow along its course, with marshy stretches dense with sedgy tussock and flags intervening at intervals, the shallow stretches of the

Color

THE WHITE MYSTIQUE

BY PETER BARRETT
SENIOR EDITOR

Patterns with a common denominator attractive to trout. Dries (from top left): Royal Coachman, Coachman, Ausable Wulff (also in trout's jaw), White Wulff. Wets (from left) are a Coachman and a Thor

By now most of us are aware that there are patterns to successful bass fishing. Catch one off a point in 10 feet of water on an XYZ darting diver and chances are you can repeat soon afterward at similar points with an XYZ. Bass pattern.

Well, why not a trout pattern?

It happens that I stumbled on one recently—a pattern about fly patterns for stream fishing. And as so often occurs in detective stories, it all began by pure chance. It was April and the Shepaug River in southwest Connecticut had recently been stocked with brookies and rainbows. My wife Pris had snapped off a Gray Ghost streamer fly (the last one) and rummaged through my box of streamers, bucktails, and big wets.

She picked a Thor, a weighted steelhead fly of which I had several following an Alaskan trip. I'd never fished one. The fly has a white bucktail wing, red chenille body, brown hackling, and a hot-orange tail. She made a cast and tucked the rod under her arm while she got out a cigarette. It was so windy I thought she'd never get the thing lit. I reflected on how maddening it is to watch someone new to trout fishing do all the wrong things . . . pick a fly because it's "pretty," let it sink when the fish were up near the top. That sort of thing.

At last she grabbed the rod again, gave it a twitch, and instantly was onto a heavy fish. She got busy again after I'd netted her 2-pound rainbow and soon caught another good one. Then a hefty brookie. At this she quit. "I've used up my beginner's luck," she said.

That marked the start of much experimenting with weighted No. 6 steelhead flies. I soon found that those with a fair bit of hot orange in their patterns—Orange Optic, Silver Demon, etc.—were worthless for Eastern trout. We caught a few on a Skunk, Black Prince, and Gray Hackle. But the Thor remained outstanding, and when the Alaskan supply was used up, I began tying my own with a slight variation—red tail in place of hot orange, polar bear hair instead of white bucktail.

Friends who borrowed Thors carried them to many places, usually with good results. My neighbor Duncan Barnes had exceptional luck with one in New Zealand. I still consider the fly outstanding for the high waters of spring, particularly for *stocked* brookies, browns, and rainbows.

A bright fly like this is often called an attractor because it is so visible in the water. But there has to be some quality other than size, shape, and coloration that make trout take willingly. In the case of the Thor I used to think it was the squishy red body that turned on the trout. Now I'm convinced it's something else and I'll get to this soon, for the Thor was the first piece of an odd jigsaw puzzle.

The second piece of the puzzle was rediscovering an old pattern I'd used in my boyhood and long since discarded—the Coachman. Only now it was improved. Crinkly white bucktail or impala had replaced the white duck-quill wings and the pattern had grown a red tail. The dry has a tuft of white bucktail tied down-wing fashion low over its back.

Ted Trueblood showed me his revamped Coachman flies on a trip to the Western high country in June of 1973. I was particularly sold on the little wet Coachman and fished several to the point of unraveling on brookies, rainbows, cutthroats, and the odd Dolly Varden. *Would the fly work on Eastern trout?* I wondered, and decided to find out.

Early one July morning I visited the Shepaug, now at its summer low and ultraclear. Those trout left over from spring stockings would be a challenge, shy and as alert as wild fish. Some could be seen and stalked, but most would come to blind casts.

I put a No. 14 wet Coachman on the dropper and a tan nymph on the point. Fishing two flies was another rediscovery of old ways that I'd found profitable because you can offer two choices with every cast, a great time-saver in determining what's good at the moment.

Mist curled from the river as I stepped into its cool current to wade wet with sneakers. The sun was not yet over the tall trees as I checked the water temperature: 64 degrees. I glanced down the first long pool in the faint hope of spotting a rising trout, but there was none.

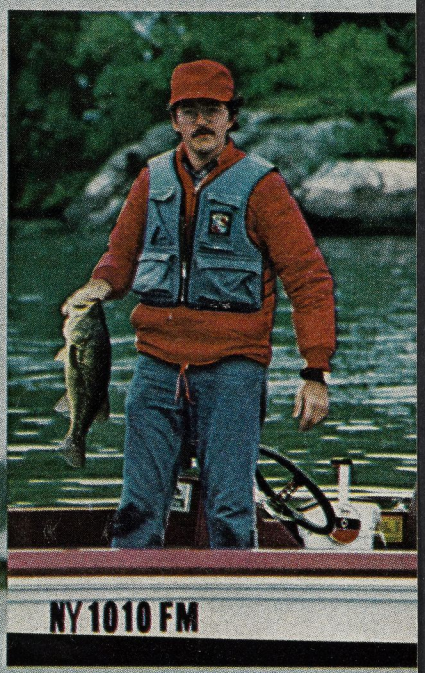
Forget about the first fish, a brookie suspended over a small spring near the far bank. I overshot the cast, hooking the nymph on a root. As the Coachman sank, the trout turned and took it but I was unable to strike. The fish spat out the fly and fled.

Forget the second fish, a brown on the nymph. I already knew about browns and nymphs, and so do you.

Then I caught a rainbow on the Coachman with a blind cast across a riffle. The sun was on the river now, boring down and warming it fast. I'd have perhaps an hour before the water would reach 70 degrees and I'd quit.

Walking the high bank of the next-to-last pool and keeping well back in the shade of oaks and maples, I saw a fish roll up ahead, quietly and with the authority that comes with a decent size. Probably it had taken some bug fallen from the thick canopy trailing down a few feet above the river and marking the fish's lie. There's not much of a summertime hatch on the Shepaug.

Backtracking, I crossed the river and cautiously waded into position. Should I try a dry fly? I looked at the hundreds of foam gobbets dot-


NY 1010 FM

NY 1010 FM

ting the pool and decided a floater would be too difficult to track. Presently I shot my wets in a long cast upstream of the fish and watched the floating line.

When I thought the flies were approaching the right spot I twitched them. There was a swirl, then the wonderful live feeling of a solid take. But soon I knew I'd hooked another of our trophy chubs, about a 10-incher. The river is crowded with the miserable things and all are aggressive. I unhooked this one from the Coachman and tossed it into the bushes.

The next cast brought a chub double. Then another executive chub.

In desperation I forced myself to fill and light a pipe, then smoke most of it while the river calmed down. I caught another cursed chub and thought: *One last cast.*

The river exploded. A handsome brown vaulted out and raced upstream. More jumps from the first summer trout to take line off the reel. But soon the warm water took its toll. The trout tired quickly and I backed up to beach it and noted with satisfaction that the 16-incher had taken the Coachman. I killed the fish for supper and blessed the Shepaug for serving up a memorable morning—three kinds of trout that came to the Coachman, including the biggest brown of two seasons.

Until that day I'd never have guessed that a smartened-up brown would take a Coachman when it had the choice of a nymph too. Anyhow, that was the beginning of fitting the second piece of the puzzle into place.

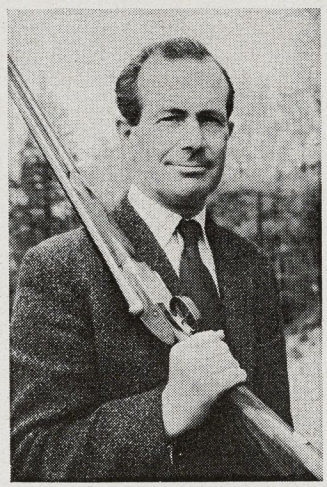
Other Eastern trout in other places showed a liking for the wet Coachman. I had one fantastic morning on a Vermont stream south of Rutland with a dry Coachman, but put this down as a fluke, for I considered the fly an evening pattern. For sure *(Continued on page 130)*

IN TROUT FLIES

REX GAGE: SHOTGUN INSTRUCTOR

BY SID LATHAM

Sid Latham's *experience as a sportsman is worldwide*



At $120 an hour, Englishman Rex Gage may be the highest-priced shotgun instructor in the world. But if you travel to Holland & Holland's Shooting School near London, where he is head man, you will hear few of his students complaining.

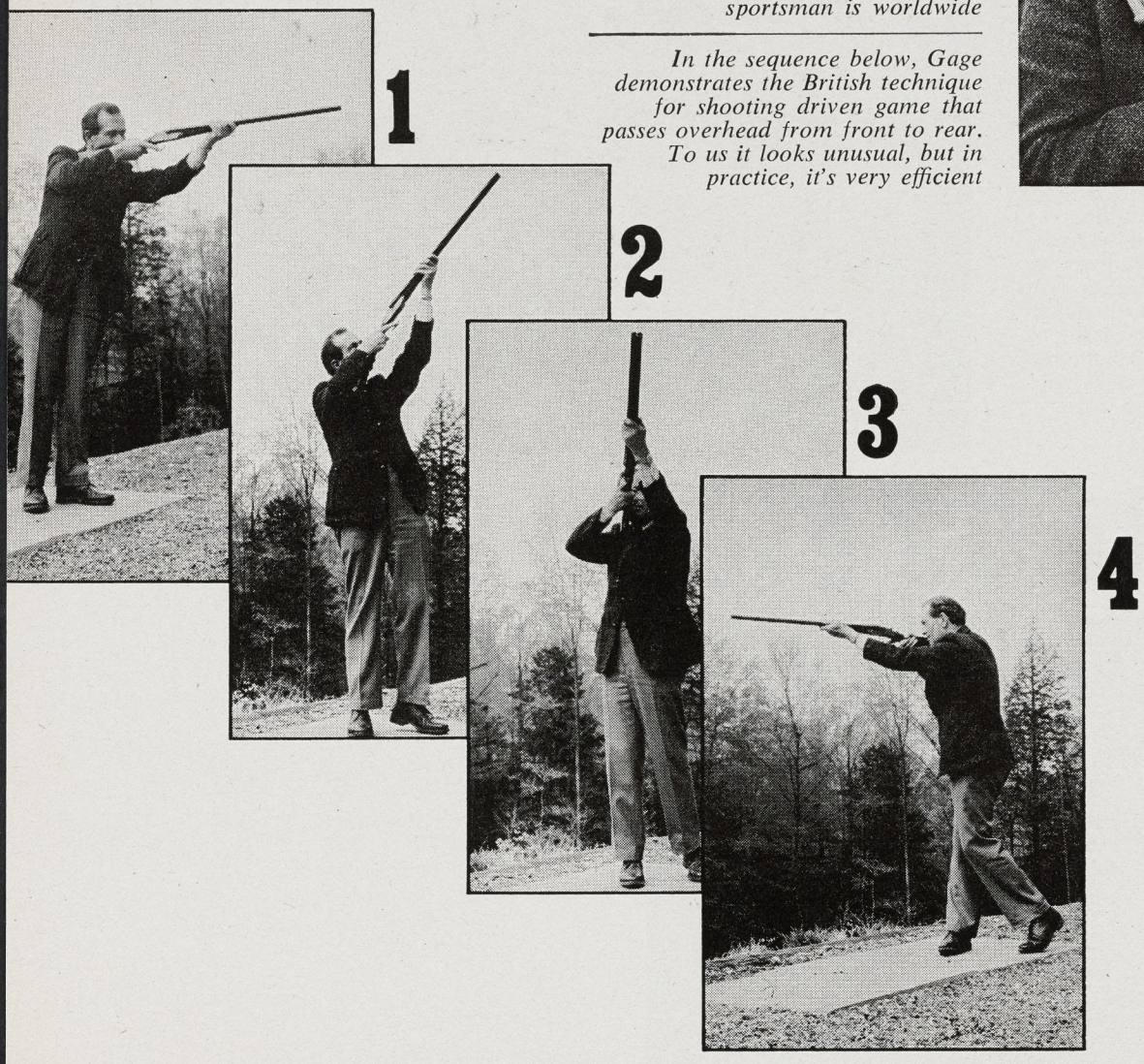
Gage is a rare individual with a talent for both shooting and teaching. He had never handled a firearm until his military service in 1944, at which point he found himself in the embarrassing position of outshooting his army instructors. Such obvious talent was not to be wasted. He was sent off to be a sniper instructor at the British Small Arms School of India. Returning to England at the war's end, he cast about for a job and found one at Holland & Holland.

Since then, Gage has risen to international prominence. Among his more famous students have been the Crown Prince of Sweden, Prince Juan Carlos of Spain, and the Maharajas of Jaipur and Bhopal. He often travels to the Continent to instruct sportsmen in France, Belgium, Spain, and Italy. And each spring he has made a yearly tour of the United States, bringing his brand of shooting to American sportsmen.

When it comes to advice, Gage gets right to the point. Asked about the most important factor in shooting, he didn't hesitate to reply, "Perfect gun mounting. Without it you can never arrive at perfect gun fit." Gage feels Englishmen probably have better-fitting guns than anyone else in the world—not only because they place an emphasis on gun fit, but because they have the facilities to be properly fitted.

Gage prescribes this method for testing whether you mount your gun correctly: Move outdoors and focus on a spot in the distance. Mount the gun and see if your eye is still focused on the same spot. As any experienced shooter knows, the head should never be moved when you mount the gun. The same test can be done indoors by placing a mark on a mirror, moving back about 25 paces, and mounting the gun to the mark. Either way, a few dozen attempts will reveal errors in your technique. *(Please turn the page)*

In the sequence below, Gage demonstrates the British technique for shooting driven game that passes overhead from front to rear. To us it looks unusual, but in practice, it's very efficient



8 mg. "tar", 0.7 mg. nicotine av. per cigarette by FTC method.

I'm realistic. I only smoke Facts.

FACT 1: We don't want your taste buds to go to sleep.

FACT reduces the aldehyde* gases that we believe muddy the flavor of fine tobaccos so you can enjoy wide-awake taste.

FACT 2: We have smoke scrubbers in our filter.

These Purite® scrubbers work like magnets to reduce these same aldehydes and let the fine flavor come through.

FACT 3: We have a patent on flavor in low 'tar' cigarettes: #3828800.

Our Purite filter helps deliver flavor in a way so new we've been able to patent it.

Add it all up. Low gas, low 'tar,' great flavor. That's a FACT.

*Formaldehyde, Crotonaldehyde, Acrolein

Warning: The Surgeon General Has Determined That Cigarette Smoking Is Dangerous to Your Health.

Available in regular and menthol.

Here are a few hints for reading the results: If the barrel points over the top of the marker, the gun has insufficient drop; if it points below the mark, it has too much drop. If the barrel points to the left with both eyes open, the left eye dominates. This problem can be solved by shooting with the left eye closed or by having the stock reset with proper cast-off.

WITH a new student, Gage watches closely how the gun is mounted. "You must find out what your pupil does naturally and not disturb his style. Any disruption will drastically change the flowing movement of his gun and body." The next step is to pattern the gun. In England a large, whitewashed steel plate is used; in America, a large paper target. To determine how a student's gun must be adjusted, Gage also takes measurements with a *try gun*—a shotgun equipped with a special stock that can be adjusted for height of comb, drop at heel, pitch, cast on (or off)—made to fit anyone of any size and build perfectly.

Next instructor and student move into the field. Here the student fires at clay birds thrown from various angles while the instructor observes and makes suggestions. Basically, Gage stresses a pointing movement of the gun, with emphasis placed on correct foot stance. At the first sound of movement, the feet are properly placed with the left foot slightly leading. This enables the shooter to transfer weight from one foot to another, and swing in the direction of the bird, without being thrown off balance.

Gage finds distinct patterns in the way Americans shoot. "It's actually a matter of environment. Most of the field shooting in your country involves walk-up birds. The bird is flushed by the gun or a dog. It is totally different from the type of shooting we do in England, which is driving birds."

Gage recommends that, particularly on driven game, you pick up the bird from behind and swing through as you fire. He works hard at getting his clients to develop a swing which automatically picks up sufficient lead to hit the bird. "This lead will come naturally on any shot," Gage says. "It makes no difference at what speed, elevation, or distance the bird is flying."

Comparing field shooting to skeet, Gage stresses, "Before you call for a bird in skeet, the body is positioned just so, the gun is mounted correctly, and the mind is set. In game shooting the same must be done. You must get set for the shot, regardless of how little time you have. If a bird is flushed before you mount the gun, stop and set your feet. Barrels should be straight out in front of you and the stock held *tightly* under the armpit. The latter will force you to find the bird before swinging wildly in all directions. It will also prevent your firing a wasted shot or seeing the bird do something totally unexpected. If the coordination of footwork, gun mounting, and timing is correct, the bird will be hit."

Even with all his years of experience, Gage admits he still can't tell how fast a given bird is flying. He does know that if the shooter hesitates or tries to correct his swing, he will take his eye off the bird, perhaps glance quickly at the sight, and invariably miss.

Another important point, particularly with double-trigger guns, is to place the *pad* of the finger on the front trigger's edge. Then you can slide instantly to the rear trigger.

ONE THING does puzzle Gage about America. "Despite the great shooting fraternity in your country, there are few instructors. If you play golf or tennis and want to improve, you go to a pro. The same applies to riding and skiing. Yet for a sport with as huge a following as upland bird shooting, practically nobody is available to give proper instruction.

"Even in a small country like England, we have a large number of shooting schools. Why not in the United States?" A good point, yet there doesn't seem to be a rush to open shooting schools in this country.

One deterrent may be doubt that the money spent for a couple of hour-long lessons is worthwhile. I believe it is. I've had instruction from Gage in England as well as in this country, and my bag of birds has gone from fair to pretty darn good. The privilege of having his experienced eye focused on you alone may sound like a luxury befitting only a prince or maharaja. But a lesson with someone like Rex Gage may prove to be the wisest investment you ever make. Throughout your lifetime as a hunter, it will continue to pay rich dividends.

Richard Petty says,

"If you really want to learn how to repair cars, check out NRI home training."

You learn in your spare time and they give you the training and equipment you need to get you started in a hurry.

Richard Petty, NRI Automotive Consultant, and America's Winningest Stock Car Driver.

My Dad made auto mechanics out of us long before he'd let us enter a race...so I learned the importance of a good mechanic early...and the opportunities that are out there for well-trained men. That's why I'm sure glad to see training like the two NRI courses come along. With NRI, you learn at home in your spare time, at your own pace. And get solid, hands-on training for practical experience. It's a lot of training for the money.

Learn Auto Servicing Fast.

NRI's Basic Professional Repair Course covers the basics of auto repair in 30 "bite-size" lessons. From headlight to tail-light, you'll learn all you need to know, quickly. Your training includes important service equipment like an Inductive Pick-Up DC Timing Light, Diagnostic Analysis and Tune-Up Instrument, tune-up tool kit, and more.

Become a Professional Mechanic.

NRI's 70-lesson Master Automotive Technician Course includes all the equipment, tools, and training you need to be a real pro. In addition to carefully planned, easy-to-digest lessons, you receive all the tools and equipment in the basic course plus a precise Ignition Analyzer Scope, Carburetor Air-Fuel Tester, and a Silent Vacuum Test Pump that helps you detect even the slightest air leakage. You'll learn to service electronic ignitions systems, vacuum controls, pollution control systems, fuel injection systems, auto air conditioning, brakes, and much more.

Train with the Leaders—NRI and McGraw-Hill.

No other school has NRI's experience in home training or McGraw-Hill's background in continuing education. Mail the coupon for a free catalog showing all the facts and describing the complete course. Over a million students have trained at home the NRI way. You can too. If the postcard has been removed, write to address below. No salesman will call.

Or check out these other growing fields.

Small Engine Repair

There's plenty of opportunity for the man who can service lawn mowers, garden tractors, chain saws, tillers, outboards, mopeds, motorcycles and other small engines. NRI training includes professional tools... inductive tachometer, volt-ohm meter, torque wrench, valve spring and ring compressors and more. And you learn by doing, actually building a 3 1/2 HP engine as part of your training. Choice of basic and advanced courses. Check postcard for catalog.

Air Conditioning/ Refrigeration/Heating including Solar Technology

Gets you into a wide-open, fast-growing area with practical training that includes lessons on solar heating, heat pumps, etc. Course is complete with professional tools and window air conditioning unit for demonstration and troubleshooting practice. Two courses, with Master Course including optional training at York Institute Resident School at no extra charge. Check card for catalog.

Electrical Appliance Servicing

Good appliance repairmen are hard to come by. NRI trains you for your own full- or part-time business in fixing everything from toasters to refrigerators and freezers. Step-by-step training includes professional appliance tester for fast troubleshooting. Check card for catalog.

NRI McGraw-Hill

NRI Schools
McGraw-Hill Center for Continuing Education
3939 Wisconsin Avenue
Washington, D.C. 20016

The white mystique in trout flies

(Continued from page 49)

you could see it into deep twilight.

The astonishing, final pieces of the puzzle fitted into place two years ago when Dick Dickson, a New Jersey fishing friend who weekends in the New York Adirondacks during trout season, gave me half a dozen Ausable Wulff dry flies in assorted sizes.

This fly was originated about ten years ago by Francis Betters of Adirondack Sport Shop, Box 133, Wilmington, N.Y. 12997. The Ausable, one of the better trout streams of the northern Adirondacks, flows past Wilmington.

THE Ausable Wulff has divided white impala wings, a brown hackle paired with a dark grizzled one, rusty-orange body, dark yellow-tipped woodchuck tail, plus a dab of fluorescent orange paint at the head. Mine went into a plastic box containing other dry flies with white in their patterns: Coachman, Royal Coachman, Renegade.

Two Julys ago I headed west again and camped beside the North Fork of the Boise River in the Idaho high country. Having fished wet flies through spring and early summer back home in Connecticut, I was desperate to put a floater on this river. It's a wide, meandering stream with plenty of pools a yard or more deep, and good runs along grassy banks. Sections are swift, but there is lazy water too.

Ted Trueblood and I got in at midmorning. No hatch was coming off. Now this is common the world over, no matter how well supplied a river may be with mayflies, stoneflies (mostly nocturnal anyway), and caddises. You come to expect blank periods when the river seems dead, but you know the potential is there.

At such times many a dry fly aficionado prospects with some pet fly, expecting to raise a few trout. In my case this fly has long been an Adams and I put one on. But the brown rocks and gravel showing through the clear water made it impossible to keep track of the brownish Adams. The fly would light on the water and instantly disappear.

On impulse I replaced the Adams with an Ausable Wulff. Probably it would be a waste of time to fish a white-winged fly in bright sunlight but at least I'd have the fun of fishing a floater and believe me, I could really see this baby sailing down the river. Wup!

That was the beginning of an incredible day. Trueblood and I eased down the river, turning about to fish upstream at likely pools or runs. He used a dry Coachman or Renegade, I forget which, but it seemed to me that my Ausable Wulff was getting more action. I say this because we were taking turns—whoever caught a fish quit, then the other guy could try the same stretch if he wished, or have first crack at new water.

There were times when Ted prospected good-looking water without result, then went on downstream. It was now okay for me to toss a fly where he'd just tried. Quite often the Ausable Wulff scored. By lunchtime my first fly had been demolished and I threw it away.

We now began keeping trout for breakfast and by the middle of the afternoon had stashed a mess in my wicker creel. I cleaned the fish—mostly Cutts and a Dolly or two—and in the process my box of white-winged flies fell from my vest and floated off down the river, lost forever.

I didn't know this as we strolled toward camp. Now that the sun was behind a peak, a hatch began and trout splashed everywhere. But I was reliving one of the best dry fly days I'd had in years and wondering at the startling performance of the Ausable Wulff. . . .

OUR next camp was near a fork of the Big Lost River, still in Idaho, only now we were next to a well-traveled road. The banks of the river had paths worn into the grass. Yet the pitiful remains of the Ausable Wulff that was on my leader when I lost the box of flies still brought up trout at most hours of the day. In time the fly came apart and I switched to wets.

On the last morning I rummaged through my storehouse box of dry flies and found several No. 12 White Wulffs. I had last used these in 1949 when staying at Lee Wulff's Portland Creek camp in Newfoundland. One afternoon Lee had flown me to a pond and I'd hiked across the tundra to fish a flowage for brookies with these flies.

They were excellent, but I somehow came to think of them as odd-ball flies for wild, dumb brook trout, and they'd gone unused for the intervening twenty-seven years. Now I put one on. "You're crazy," Ted remarked.

I was. But so were the fish. So was the fly. When I laid it in one of the narrow channels between floating water weeds and there was no drag or hangup, a strike was almost guaranteed. Wild brookies and cutts, plus a few rainbows.

Consider this. Cars were whizzing by. It was high noon. Hundreds of people must have worked this water. Yet trout of 10 to 12 inches were slamming the fly. If I didn't know that I am an honest fellow, I wouldn't believe it.

The light bulb finally turned on—most of the trout I'd caught in recent years had been attracted to and taken flies having a common denomi-

nator: white hair in their pattern.

Now you may think: *But if he prefers white-winged flies and catches trout on them, so what?* Remember that I've been fishing a pair of wets for quite a spell, and with a Coachman or other white-winged pattern on the dropper—plus some drab wet or nymph—I'm giving the trout a choice. Most of the time it's the bright dropper that gets the fish. . . .

HOME again, I got a rush order of Ausable Wulffs from Francis Betters and set out to try the fly on Eastern trout where I could still find fish. It worked, though better in fast water than in slow. I even made a trip to the Shepaug. I say "even" because as expected, little clumps of foam floated on the pools and completely blanked out the Ausable Wulff after it lit.

But by watching the area where I knew the fly was and striking at any splash, I caught two holdover browns one morning. Plus chubs and a smallmouth.

The fly didn't always work, however. Mayflies perfectly matched by a Light Cahill were coming off Titicus Outlet one afternoon in New York's Westchester County. I know this river well. Never had I seen a trout take one of these mayflies, nor had I ever had a rise to a Light Cahill. But I tried one anyway because there was a hatch. Nothing. I switched to an Ausable Wulff. Nothing.

I was fishing a sure stretch, by the way, based on past experiences. Then I tied on an Adams—it had always worked here before—and caught two browns. Why was this? I don't know.

I asked Betters why he thought his fly was so good. He said he'd got lucky and that the fly was "a composite of the big mayflies and stoneflies we have in our fast Adirondack streams, but fishermen tell me it has an appeal in other waters."

Spring Trout Tips!
Next Month
In Field & Stream

I'm now convinced there is a mystique about trout flies with a flash of white hair wings weaving a spell in tumbling waters, or shimmering enticingly above them. So did the men who improved the wet and dry Coachman, and the Royal Coachman.

Oddly, I'd always been *against* trout flies with white until that day my wife picked a Thor and started catching the hell out of our Shepaug fish. From that day, I followed paths that finally changed my mind.

Think about all this the next time you face a trout stream. You can catch them better down under with a flash of white. And quite possibly you can provoke action on top with a white-winged creation when there's no hatch to match.

Where and How to Begin

BY ED ZERN

Angling is like writing—the hardest part of it is just getting started

One of the things that has impressed me most since I put on the Fishing Editor's hat (the smelly one with the beat-up Muddler Minnows in the band) is the number of letters I get along the lines of this sample from a recent batch of reader mail:

"Dear Sir: I live in Nebraska near Harry Strunk Lake. Please tell me what part of the lake would be best to fish in. Also what baits are best. I am 14 years old and read Field & Stream every month."

And this one:

"Dear Mr. Zern: I am 28 years old, and would like to take my four-year-old son fishing, but I don't know where to go or what to do. Can you advise me how to get started, what basic equipment I need, and so forth. I am in good health, work as a carpenter so have some manual skills, but have never fished or hunted."

(There was also this gem: *"Fishing Editor: I am writing a term paper on fishing as sport and recreation. Please send me detailed information on the history of fishing, different species of fish, methods of fishing, benefits of fishing, and the future of fishing. This is needed urgently."*)

I try to answer, or at least acknowledge, all inquiries addressed to the Fishing Editor, but lately I've begun to send a number of postcards on which I simply write "I don't know." It's flattering to be considered omniscient, even by 14-year-old budding fishermen, but while I have a pretty good idea where Nebraska is, having driven through it several times on my way west to Montana, and although I'm aware there's some excellent river and reservoir fishing in that state, I have never heard of Harry Strunk Lake or, for that matter, of Harry Strunk. (I don't mean to sound snide about Mr. Strunk, because whoever he was, he had a lake named after him; the only thing ever named after me was one of Gene Hill's Labrador retriever puppies, and the people who bought it changed *that*.)

So the young Nebraskan, who might have got one of those I-don't-know cards if I had been in a surlier mood, got this instead:

"Dear R - - - H - - - -: I haven't any idea what part of Harry Strunk Lake would be best to fish in, because I don't know anything about the lake, or even what kind of fish are in it, if any. So I don't know what baits would be best, either. But I'll tell you some ways to find out. First, every state I know about has some sort of a fish and game department, sometimes under a fancier name, with a man on its payroll whose job it is to answer questions like yours about the fishing and hunting in that state. Usually he's called an Information and Education [or 'I & E' for short] Director, and according to my spies the man who has this job in Nebraska is Mr. Rex Amack. His office is at 2200 North 33rd Street, P.O. Box 30370, Lincoln, Neb. 68509. He works for the Game and Parks Commission, and he has a lot of other chores besides telling people about the fishing in Harry Strunk Lake, but if he can't answer your question he'll turn it over to someone who can, or write and tell you who to ask in your community. [People change jobs, so to be on the safe side you might address your letter to 'Chief of Information and Education,' which is, or was, Mr. Amack's official title.]

"That's one way, but it means writing a letter, and waiting around until Mr. Amack finds time to answer it, or send you the information. A quicker way is to find out the name and telephone number of the game warden, or game protector or conservation officer or whatever he's now called, in your area, and ask his advice. Most of the wardens I've known were real experts, and didn't mind sharing their knowledge with other people, especially with youngsters.

"Another way—and perhaps the best of all—is to find out who's the best fisherman on Harry Strunk Lake, or one of the best, and ask him for help. Most of the good fishermen I've met are pleased when somebody recognizes their talent by asking for advice, and are happy to give it. One way to find out who's the best fisherman is to ask the man who runs the sporting-goods store in your town (or the hardware store, or auto supply store, if that's where fishermen buy their equipment).

"If you can't locate any hot-shot fishermen in your neighborhood, find *any* fisherman—chances are he'll know more than you do about fishing the lake, and be happy to tell you what he knows. If he isn't, he probably doesn't know much. But probably he'll invite you to go fishing with him, and that's the best way of all to learn. Good luck."

And here, if you don't mind reading other people's mail, is my letter to the father who wanted to start fishing so he could take his very small son with him:

"Dear Mr. M - - - - -: One of the good things about fishing is that you can enjoy it as much when just starting as you can when you've accumulated enough experience to qualify as some kind of expert—in fact, you may enjoy it more as a novice, because after forty or fifty years and several thousand fish some of the excitement wears off (but I have an English book dedicated to the author's grandfather who died at the age of 91, after 70 years of salmon fishing, of a heart attack brought on by the excitement of hooking a large salmon in the River Tay).

"I would suggest two simulta-

THE CASE FOR COLOUR

The Yellow Dog with fluorescent tag.

ALTHOUGH trout flyfishers, and still-water trout flyfishers in particular, have accepted the fluorescent fly and in latter years have developed many successful fluorescent dressings for lures and nymphs and dry flies, the flyfisher for salmon has shown less inclination to depart from the traditional.

The reasons are simple enough to appreciate: salmon are scarce, and it is safer to use the flies which have been proved to work in the past; many salmon flyfishers fish beats where the services of a gillie are provided, and these worthy advisers are rarely noted for their enthusiasm for something new and different. Not that fluorescents are now as new as all that, having been around for almost 40 years; but time and progress move slowly on the salmon rivers.

The reservoir man who has come to the sport of flyfishing in the past few years has brought a new and enquiring approach to methods and fly-patterns, unfettered by tradition. This has resulted in a lot of progress being made in the field of fly-design, and modern materials and colours are part of that progress.

The salmon flyfisher is, of course, not completely hidebound by tradition. He has accepted over the past few decades the introduction of hairwings, tubeflies, Esmond Drury's trebles, and the fact that a fly skating across the surface will catch salmon in certain conditions, as will a bushy deer-hair dry fly!

He has accepted a few new salmon fly patterns, like the Munro Killer, Stoat Tail, and General Practitioner and has moved away from 5/0 singles and the fully-dressed flies of Victorian days towards slimly-dressed flies composed very often of a few wisps of hair and a body. Whatever style of fly he uses, however, he is never free of the need to choose the best possible colour of fly for the conditions at the time he is fishing, even if he gets the size and weight right.

Over the long years of salmon fly-fishing, many colour combinations have been offered to the salmon, and a definite pattern has emerged relating to some of the colours which are successful under certain conditions of water and weather. I doubt if any experienced salmon flyfisher or gillie would argue against the following:

1. A fresh-run salmon is more likely to take a fly with plenty of bright colour.
2. A fish which has been "up a bit" in low water is more likely to take a small black fly.
3. In good fly-water, fish in the middle and upper reaches prefer a slim darkish fly.
4. From dawn till sunrise, red is a good fly-colour.
5. Green is rarely successful in a salmon fly, except during the fining-down period of a summer spate.

The answer to the thoughtful angler's query as to why these things should be can only come from a knowledge of the biochemistry of the eye of a salmon, and the changes which affect it while the fish is in the river; in other words, knowledge of the mysteries of fish vision. Only the most scientifically-minded would want to go further into the question, and the vast majority really "don't want to know".

When it comes to fluorescents, salmon anglers are still too conservative, says TOM SAVILLE

Take the average salmon flyfisher; he does not really know whether fish see colours or not, nor if they see best in dull or bright conditions, and the puzzling success of tiny dull flies on some days and brightly-coloured flies of similar size on other days adds to the confusion. He therefore tends to take the ghillie's choice unquestioningly, or go back to the fly which was successful "last time". Progress can only be very slow, if at all.

The thought of using flies incorporating fluorescence hardly enters his mind, and, unless he is a fly-dresser too, sources of such flies are very few anyway. But there is no doubt, say some of the more adventurous of the other anglers he talks to, that under certain circumstances fluorescent flies beat the others hands down.

With this in mind, it would be easy for the experimenting flyfisher to fall into the trap of using the same fluorescent colours as the trout-fisher does, for a given set of conditions, forgetting that the salmon is a migratory fish and the reservoir trout normally isn't. To avoid this trap, we must look at the two facts mentioned previously — that a fresh-run salmon likes a bright fly and a stale fish likes a black fly. We then conclude the very important idea that *the longer a salmon is in the river, the less it is attracted by colour.*

For the explanation of this behaviour we are indebted to Thomas Clegg, the master fly-dresser and pioneer of research in fluorescent flies. He investigated the scientific aspects of the problem and discovered that the reduction in the attraction of colour is due to the reduced ability of the salmon to see colours after being in the river for some time.

Reduced to simple details, the reasons for this phenomenon are quite logical. The salmon's recognition of colour is dependent on the production, in the retina of the eye, of a substance called porphyropsin. This substance is made from vitamin A_2 and protein under the influence of an enzyme and in conditions of light; in the dark, the porphyropsin

disappears. Every day, fresh supplies of porphyropsin must be made, therefore more vitamin A_2 and protein are needed.

A fresh-run fish, having just come up from the sea where food is plentiful, is full of vitamins and protein; production of porphyropsin is assured and the fish sees colours well. In the river, the non-feeding salmon's reserves of vitamins and protein are continually reduced — simply in the process of staying alive — until the fish can no longer produce enough porphyropsin to enable the eye to see colours. In modern human terms, colour TV gradually becomes black-and-white!

It is logical to asume that fluorescent colours, being so much more visible, are more easily seen by the salmon during the period when colour vision is becoming less acute. Even when colour vision is at its best, perhaps the greater visibility of fluorescents is of value when water colour cuts down intensity?

I would suggest that fluorescents are therefore more likely to bring the salmon to the fly, especially if the correct colours are used for the prevailing conditions of water and weather. Trout fishers have already learned that some fluorescent colours are better than others under certain conditions. Certainly, the idea that fish cannot see fluorescents because water absorbs the ultraviolet light which activates them has been disproved by practical experience.

The eight fluorescent 'Depth Ray Fire" (DRF) colours normally used by the trout flyfisher can be reduced to six for use in salmon flies. Phosphor Yellow and Electron White are of little use.

Neon Magenta: Excellent for evening fishing and dull days.

Arc Chrome: Probably the most useful of all, a real attractor expecially in bright conditions.

Signal Green: For coloured waters.

Fire Orange: For fresh-run fish and for dawn use in summer.

Horizon Blue: In small low-water patterns usually.

Sunrise Pink: A good shrimp-fly colour, especially for peaty water.

Before launching himself into the "deep end", the cautious angler could perhaps dabble a toe in the shallow end by trying the more well-known successful salmon flies adapted by the merest touch of fluorescence and comparing the success rate.

For example, Yellow Dog (Garry) with the addition of a tuft of Neon Magenta DRF floss to the tail, and three turns of Arc Chrome DRF wool as a butt at the rear of the body, has the added attraction of fluorescence without changing the overall appearance of the pattern. Obviously this is the approach to adopt at first.

Another easy one is Hairy Mary with a length of Arc Chrome DRF floss on either side of the brown hairwing — or Logie with Arc Chrome DRF floss for the rear of the body instead of the usual yellow floss. Other examples which spring readily to mind are Jeannie (Arc Chrome DRF floss for the rear of the body as in Logie) and Blue Charm (Arc Chrome DRF floss as the tail instead of golden pheasant crest feather).

Many tubeflies lend themselves to adaptation to fluorescence, being mainly of hairwing design. Hackles have been dispensed with and replaced by coloured hairs; these in turn can be replaced by strands of fluorescent floss mixed in with the basic hair material. For example, the Thunder and Lightning tube fly can be made fluorescent by mixing strands of Horizon Blue and Arc Chrome DRF floss on opposite sides of the tube, among the dark hair winging material. The floss takes the place of blue and orange hackle and cheeks.

☆ ☆ ☆

This substitution of DRF or fluorescent materials for the traditional ingredients can be extended to give the benefit of fluorescence to many other salmon flies. The commonly-used golden pheasant topping crest is replaced by strands of Arc Chrome DRF floss. Yellow floss gives way to Arc Chrome DRF floss in bodies (do not use Phosphor Yellow, which fluoresces green). Hot orange floss is replaced by Fire Orange DRF floss; blue floss becomes Horizon Blue DRF floss, and red floss can be changed to Fire Orange or Neon Magenta DRF floss according to the amount of brightness which seems to be suitable.

If the original body-material is seal fur, there are fluorescent seal furs in the appropriate colours, or DRF chenille could be substituted for maximum brightness. DRF wools have less sparkle than floss, and are more suitable to tags, butts, and bodies where a solid mass of colour is required. Feather winging materials can be dyed with fluorescent dyes. Apart from the floss mentioned previously, hairwings can incorporate fluorescent man-made fibres such as Dynel or Fishair.

It has not been conclusively proved that too much fluorescence has an adverse effect on the fish, and modern experiences with the very brightly fluorescent reservoir lures rather point to the opposite so far as some trout are concerned. Many of the old fully-dressed salmon flies were a blaze of colour, and took plenty of sea-liced fish, so there is great scope for experiment in this fascinating subject.

Trouble with tandems?

THE LINKING together of hooks in tandem fly-dressings sometimes seems to give difficulty. Perhaps my way of dealing with the problem will prove helpful to others. I have used tandems so-tied at Rutland and have had no problem landing brownies and rainbows up to 4 lb. If a fly becomes snagged, it is the leader which will break rather than the hooks pull apart.

Place hook in vice (the rear hook of the tandem) and thread through the eye about 3in of 30 lb nylon. Allow the nylon to extend about 1in beyond the bend of the hook.

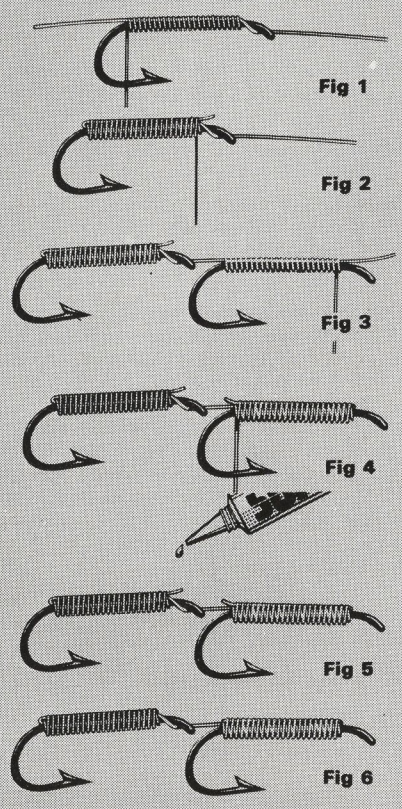
Whip this on with a strong silk, starting near the eye and ending at the bend and half hitch *(Fig 1)*. The whipping should be open, so that it is possible to see the hook and nylon between the silk turns.

Bend the nylon over the top of the whipping and whip back towards the eye of the hook and finish off *(Fig 2)*.

Place the front hook in the vice and bring the other hook behind it allowing the protruding nylon to run along the hook. (A small piece of 'Sellotape' will hold this in position if you have difficulties.) Now, starting at the bend, whip towards the eye and half-hitch *(Fig 3)*.

Bend the nylon back over the hook and whip to the bend and finish off *(Fig 4)*.

Run a little 'Super Glue 3' along the hook-shanks and allow it to dry *(Fig 5)*. It is practicable to make up half-a-dozen or so tandems at a time, and it is helpful to place the hooks in a piece of polystyrene, sponge or ethafoam



and to glue all of the made-up tandems at the same time.

Trim off the nylon ends *(Fig 6)*.

After ten minutes you can start dressing the flies.

Freddie Rix

PRINTED IN THE U.S.A.

Printed and bound by
AMERICAN BOOK-STRATFORD PRESS, INC.
New York, U.S.A.

wood, J. L., 'Alaska, an Empire in the Making' (London 1913); Ortroz, F. von, 'Conventions internationales concernant l'Afrique'; Lalanne, 'La France et ses colonies' (Brussels 1898); Colonial Reports issued by Secretary of State for the Colonies (London); Statistical Abstracts for the Colonies (Annual); Blue books of the respective British colonies; Ram, V. S., 'Comparative Colonial Policy' (1926); Padmore, G., 'Africa and World Peace' (London, 1937); England, R., 'Colonization of Western Canada' (London 1936).

COLOPHON (Gr. *Kolophon*, "summit"), an ancient Ionian (Greek) city of Asia Minor situated at a short distance from the coast and about 15 miles north of Ephesus. Its inhabitants were removed by Lysimachus after the death of Alexander the Great. Colophon was one of the places that claimed to be the birthplace of Homer. It was the native city of Mimnermus and other poets. Its site was discovered in 1887 by the German explorers, Schuchhardt and Wolters. Proverbially Colophon came to mean "a finishing stroke" because of the many instances in which the city's cavalry carried the day. The word took this proverbial meaning in Latin and was used by early printers as the imprint at the close of a volume; commonly used before the introduction of the title page. See next article.

COLOPHON, kŏl'ō-fŏn, an inscription at the "Finis" of a book, giving the printer's name and date and place of printing; in the early days of printing nearly all books had colophons. Usually they are ludicrous in the extravagant claims the printers made for the unapproachable excellence of their handiwork; but some are modest and dignified, while a few are pathetic, showing the hard struggle made by masters of the noble craft for a bare subsistence.

COLOPHONIUM. See Rosin.

COLOPHONY, a name formerly used for common rosin (q.v.), but now seldom so used, though still given in the dictionaries.

COLOQUINTIDA. See Colocynth.

COLOR. Color may be studied objectively as a wave phenomenon (see Light), in its psycho-physiological aspect as a retinal stimulus (see Vision), or, subjectively, as an appearance or ocular sensation; this last is the viewpoint of the present article.

Isaac Newton ('Philosophical Transactions,' No. 80, 1672) was the first to show that white light (sunlight or daylight) may be resolved into elemental colored lights or rays which cannot be further decomposed, but which on being superposed form white light. The question whether sunlight contains these colors in the form of a mixture analogous to a mixture of, say, nitrogen and oxygen gases in the air or is a compound, as water is of hydrogen and oxygen, belongs to physics. Newton adopted the first point of view; at the present time the second is gaining favor. The elemental lights, distinguished visually by their colors, are seen in the rainbow, the sparkle of a diamond, in soapbubbles, in a film of oil on water, by looking at one's eyelashes through nearly closed lids, and in many other phenomena discussed in physical optics under the names dispersion, interference, absorption, polarization, fluorescence, diffraction, refraction. They are called spectrum colors — popularly, "colors of the rainbow" — and are monochromatic, i.e., they consist of single colors (colored lights or rays) that are elemental in the sense in which this term is used in chemistry. We are accustomed to think of the spectrum as having only six colors: red (R), orange (O), yellow (Y), green (G), blue (B), violet (V); Newton named a seventh, indigo, situated between B and V. But the number of colors is enormously great; Aubert ('Physiologie der Netzhaut,' 1865) estimated the solar spectrum to contain about a thousand distinguishable hues, of which, according to Rood ('Modern Chromatics,' 1881) 2,000,000 tints and shades can be distinguished. However, these differences cannot be seen *in situ* in the spectrum because the color areas are too small. Luckiesh ('Color and its Applications,' 1915) states that 55 distinctly different hues have been seen in a single spectrum.

Color Sensation.— Color is a sensation produced through the excitation of the retina by rays of light. Thus black (Bk) and white (W) are color sensations, although Bk is due to no, and W to complete, stimulus The infra-red rays — below the red end of the spectrum — and the ultra-violet — beyond the violet end — are invisible. Heat is the principal effect of the infra-red and chemical action, as on a photographic plate, that of the ultra-violet rays. To the physicist all of these visible and invisible emanations are regarded as electromagnetic waves differing essentially in wave length alone. All have chemical and thermal effects but only some give to the eye the sensation called color. Although none of the spectral colors can be resolved into others, some can be imitated to the eye by combinations of others. Combinations of R and V produce purples which are not in the spectrum at all; such compounds are nevertheless resolvable into their constituents by spectroscopy. Two colors not distinguishable to the eye may have quite different compositions. For example, a solution of potassium dichromate and one of potassium dichromate and neodymium ammonium nitrate in suitable proportions impress the eye as having precisely the same yellow color; but whereas a mercury arc light will look yellow on being viewed through the first solution, it will look brilliant green through the second. No pigment is monochromatic, yet it is possible in many cases to match spectral colors by means of pigments. Color to the eye is therefore not color in the sense of being one definite constituent of white light. Since color is entirely subjective it must be influenced by personal idiosyncracy; indeed some people are color-blind and cannot, for instance, tell red from green. (See Vision). On the other hand, santonin poisoning produces, in otherwise normal people, a pathological condition called chromatopsia, in which all "colors" are yellow. In short, the eye is unable to analyze color in the way that the ear can detect the component tones in a chord.

Color Constants.— Artists speak of cold, warm, advancing, and retiring colors. By warm are meant red, orange and yellow, and any tendency toward them; it has no connection with heat, but is suggested rather by the luminous glow of sunlight. An advancing color

seems to be nearer the eye than one which is called retiring; the effect is evident in only a few simple cases: orange seems to be nearer than green when both occur in juxtaposition on the same surface, green nearer than violet, yellow than red, red than blue, black than yellow. The reader may easily experiment with the excellent colored coated-papers suitable for the purpose, various sizes of which can be obtained in black, white and in 18 spectral hues, with two tints and two shades of each. Color has three characteristics: hue, purity or saturation, and luminosity or brightness. Hue is color *per se*, such as blue, pink, black, etc.; purity depends on freedom from admixture with white; only monochromatic colors are saturated. Luminosity depends on the amount of light given by the color. A tint is a departure from a normal or dominant spectral hue in regard to purity, i.e., tints are whiter than the arbitrarily selected normal. A shade is darker than the normal and may be produced by decreased illumination or by the addition of black. It must be clearly understood that luminosity does not affect purity: a tint cannot be made to look as saturated as its normal merely by decreasing the illumination, thus pink never looks red in a subdued light. A compound color can be defined accurately only in terms of the characteristics of its monochromatic components. But every color, simple or compound, except purple, can be matched so far as the eye is concerned by a tint or a shade of some simple spectrum hue.

Color constants are measured with a spectrophotometer, which is a combination of a spectroscope with a photometer. The spectroscope produces an ordinary white-light spectrum, one narrow transverse band of which can be passed through the photometer; at the same time white light of any intensity is superposed on this colored band. The colored light which is to be examined — in the case of a colored surface the light reflected by it — also passes through the photometer and forms a field next to the combination of spectral ray and white light. By selecting the proper hued spectrum ray, controlling the added white and adjusting the resultant until it matches in color and brightness the light to be examined, we can determine hue, saturation and luminosity. Descriptions of instruments and full references are given by Luckiesh. The following are typical results; they will vary with the reflection coefficient of the surface, i.e., with the relative amount of white light it reflects. The wave lengths of the hues are expressed in microns: 1 micron = 0.001 millimeter. The columns headed «per cent white» give the amount of white light which had to be added to the normal spectrum hue to reduce its saturation.

(ABNEY, 'RESEARCHES IN COLOR VISION,' 1913)

Pigment	Hue	Per cent white
Vermilion	0.610 μ	2.5
Emerald green	.522	59
Fr. ultramarine blue	.472	61
Brown paper	.594	50
Orange	.591	4
Chrome yellow	.583	26
Blue-green	.500	42
Eosin dye	.640	72
Cobalt blue	.482	55

(NUTTING, 'BULLETIN BUREAU STANDARDS,' 1913, 9, NO. 187)

Materials	Hue	Per cent white
Sulphur	0.571 μ	48
Cork	.586	56
Tobacco leaf	.597	65
Chocolate	.595	70
Butter, dark	.580	28
Paris green	.511	56
Manila paper	.582	65
Copper	.597	70
Brass, light	.575	60
Gold, medium	.591	64

(L. A. JONES, 'TRANS. I. E. S.,' 1914, 9, P. 687)

Source	Hue	Per cent white
Sunlight	.....	100
Average clear sky	0.472 μ	60
Tungsten lamp	.588	35
Carbon lamp	.591	25
Nitrogen tungsten lamp	.584	45
Mercury vapor arc	.490	70
Carbon arc	.584	62
Acetylene flame	.585	36

These results are color matches rather than color analyses. They show, for example, that highly colored butter, manila paper, chrome yellow paint, the nitrogen tungsten lamp and the carbon arc light are all of about the same hue and differ only in purity and brightness, i.e., they are tints and shades of one another. As the three observers did not use identical light sources in their experiments, the purities in the tables are relative. The following values from Hurst ('Color,' p. 17) give a rough idea of the luminosity of, or the amount of white light reflected by, various pigments in terms of white paper as a standard.

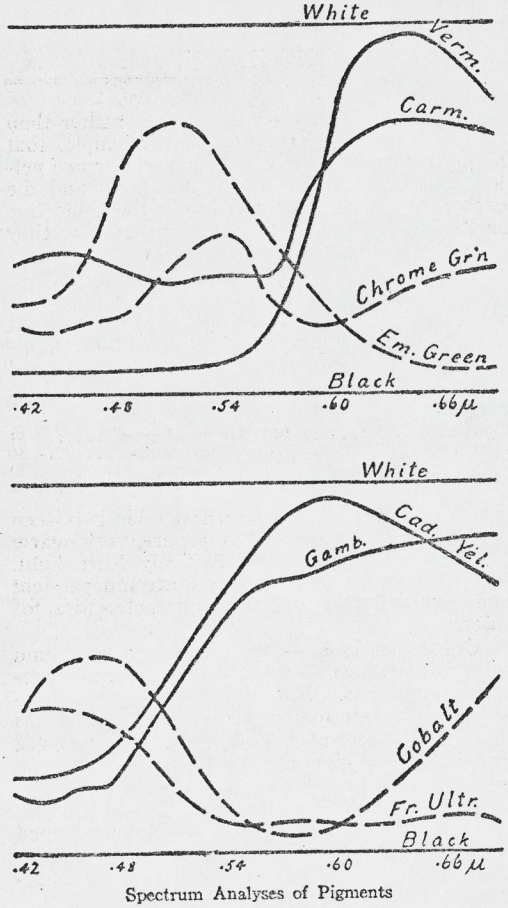
White paper	100	Emerald green	51
Vermilion	20	Ultramarine	50
Orange red	40	Umber	22
Yellow ochre	56	Chrome yellow	61

On comparison with the first table it is seen that although vermilion is very pure, very nearly saturated, it reflects comparatively little light. The two sets of numbers are quite independent and express two different characteristics of color.

Color Analysis.— Analysis of a compound color is used here to mean separation into spectral components. For example, French ultramarine is a fair match to what is regarded as the typical spectral blue of wave length 0.472 microns; both give rise to the same sensation and are therefore physiologically identical, yet the spectrum ray is monochromatic and the pigment decidedly complex. If the light reflected from a colored surface is analyzed spectroscopically it is found to contain all the spectrum hues in varying intensity.

The following diagrams, adopted from Luckiesh, give spectroscopic analyses of certain pigments. Vertical distances indicate the relative intensities with which the wave lengths along the base are reflected and correspond to luminosities in the absorption spectra. The area under a curve measures the luminosity of the pigment itself. White is a horizontal line at greatest height because it reflects all colors equally; black reflects none and therefore is chosen as the base. Gray would be some intermediate horizontal line. No analyses of mixed pigments are as yet available and it is difficult to predict the exact form of the resultant curve. However, we can arrive at approximate results. According to the diagrams a surface painted

with cadmium yellow will look intensely yellow when illuminated with monochromatic yellow light, orange in orange light, red in red and green in green, but in blue or violet light it will be grayish. French ultramarine will be violet, blue, green in corresponding illuminations but grayish in yellow, orange, red. The only color which cadmium yellow and ultramarine both reflect is green, the others being largely but not entirely absorbed. The green produced by a mixture of these two pigments although far from being monochromatic is much more nearly so than the pigments themselves. But its luminosity has been considerably reduced by absorption; in fact a mixture of monochromatic blue and yellow pigments would be black be-



Spectrum Analyses of Pigments

cause no light would be reflected at all. Mixed pigments tend toward blackness; painters therefore select pigments which possess inherent color and do not mix unless a subdued, murky or grayed effect is desired. Unfortunately there is as yet no accepted theory of inherent color; it is not known why chromium oxide is green, hydrated ferric oxide red or ferric hydroxide yellow. Consult 'Berichte d. deut. chem. Gesell' (1906, 39 p. 1959), and *Journal of the Chemical Society* (1906, 89 p. 1787); see also DYEING.

When a surface is illuminated with colored light, as in stage lighting effects, the hue actually seen depends on the local color of the surface, on the light reflected before absorption takes place and on the remainder reflected after absorption. Ogden Rood found that non-monochromatic yellow light looked bright green on Prussian blue and white on ultramarine. The Prussian blue had evidently absorbed all but the green component that must evidently have been in the yellow, while, as will be seen later, the ultramarine had absorbed all but the monochromatic yellow component. In the first case green was the dominant hue reflected, in the second case it was yellow plus blue. This shows that the parts played by absorption and reflection are difficult to predict.

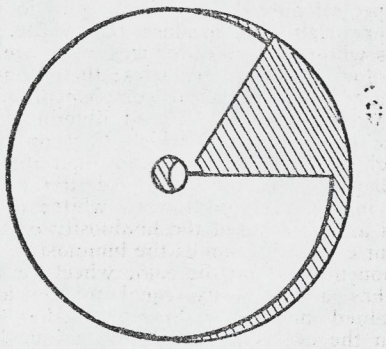
Additive Combinations.— Combinations of colors are always combinations of spectral lights whether they are made additively by direct superposition of the components or subtractively by absorption as in a mixture of powders or solutions. When red and green spectrum rays are thrown upon a white surface both colors are simultaneously reflected to the eye and give the sensation of yellow; on the other hand a mixture of red and green paints will in certain proportions give a gray which may be reddish or greenish, but never yellow, because together they subtract from the white light (daylight, etc.) which illuminates them all colors except those whose combination impresses the eye as gray. Such apparently contradictory results have been the source of many absurd controversial "theories of color." There are facts about color and theories of the psychophysiological processes of color perception but no theories of color other than chemical theories of molecular grouping.

Colors may be added in several interesting ways. Fine lines alternately red and green or blue and yellow, etc., ruled close together on white paper and examined from a distance through the large end of opera glasses so that the individual lines are not distinguishable give the eye two simultaneous sensations whose effect is quite different from that of the corresponding pigment mixtures. This method was used by Miles as early as 1839. It may be performed also by painting one end of a pack of papers with one color and the opposite end with another and then reversing alternate papers; or otherwise by stippling points of different hues on a white surface, or by using the color-wheel described later. Artists often employ the stippling process with beautiful results because the surface so treated fluctuates in hue according as one or another of the components momentarily predominates by reason of the varying degrees of fatigue of the color nerves in the retina. It has been found experimentally that all hues can be produced by suitable combinations of three physiological primaries: monochromatic red, green, blue (or violet). Thus red plus green in different proportions produce additively all the hues from red through orange, orange — yellow, — yellow, yellow — green, green; red plus blue give violet. red — violet, blue — violet and the purples; blue plus green produce blue — green and green — blue; red plus green plus blue in certain proportions give white, in others they reproduce colors obtained from pairs of the primaries. This is the first great group of phenomena that can be accounted for only by studying the subjective effect of color. It is strikingly illustrated by the Lumière, Joly and Ives-Cros processes of color photography (see

COLOR PHOTOGRAPHY), in all of which three photographs taken through red, green and blue filters are dyed with these respective colors and then presented simultaneously to the eye. Ives and Cros used three separate filter screens, Joly ruled a single one with lines alternately red, blue, green, and Lumière formed the screen directly on the sensitized plate by spreading it with a thin paste containing potato starch grains, some of which were stained red, some green and some blue.

The reasons for the facts in the above group are unknown. But by assuming a certain functioning of the retina we can form a theory which will correlate them. Like every theory this is outside of the region of fact and non-fact and is simply a mechanistic formula by means of which a whole class of phenomena can be stated in terms of a selected few. The Young-Helmholtz method of explaining color vision (see VISION) hypothecates the existence of three sets of nerves in the retina: one is strongly stimulated by the red–orange end of the spectrum and less by the rest, another most strongly by the yellow–green region and less by the ends and the third by the violet–blue end and rapidly less as we approach the red end. It is then assumed that when all three sets of nerves are acted on in about the same degree the sensation of white is produced because it is a fact that red plus green plus blue does produce white. Consider now the superposition of yellow and blue lights; according to the theory yellow stimulates red and green because red plus green equals yellow. Therefore yellow plus blue equals red plus green plus blue equals white. This does not tell why yellow and blue cause white but it enables us to predict it without experiment. If however it can be shown directly or indirectly that the eye really does contain such nerves the Young-Helmholtz theory at once enters the realm of fact. It may be interesting to note that the whitening of linen and cotton fabrics by bluing in the laundry consists in adding hardly perceptible traces of indigo or Prussian blue to the ivory yellow tint to which they revert after being washed; it is essentially not a bleaching process.

Maxwell's color wheel affords a simple and interesting method of experimenting with additive combinations. It owes its present form and use to J. C. Maxwell although it was known to the astronomer Ptolemy in the 2d century and was rediscovered by the Dutch physicist Musshenbroek in the 18th. A smooth, stiff pasteboard disc graduated at its circumference into 25, 50 or 100 parts is mounted on the shaft of a small electric motor which can be operated by a single dry-cell. A circular piece of paper painted, for instance, half vermilion and half emerald green is placed over the shaft against the disc and a small wooden sleeve is then forced on so that paper and disc may turn with the axle when the motor runs. When the painted disc turns red and green are presented alternately to the eye and if the alternation is so rapid that one color occupies the place of the other before the retinal impression of the latter has vanished then both stimuli act at the same time. The resultant color will be yellowish: not pure yellow, because the pigments are not monochromatic. Maxwell introduced single-colored discs, each one perforated at the centre and slit along a radius; two or more such discs can be slipped over one another and adjusted to expose to view sectors of any desired angle. They may be cut out of the Bradley colored coated-papers;



Maxwell Color Discs

a complete set will consist of the following colors: red, orange, yellow, green, blue, violet, black, white and neutral gray and should be made in two sizes, one about twice the diameter of the other. Dividers, into one leg of which a needle sharpened to a chisel edge is set, form a convenient instrument for cutting circles. If the motor is small the discs should not be much more than two inches in diameter, otherwise air resistance will retard the rotation enough to produce flicker. This resistance varies as the fourth or fifth power of the diameter depending upon whether the speed is low or high, and is therefore 16 to 32 times as much for a four-inch disc as for one half the size. The discs must be put together so that the radial edges do not catch the wind.

Very instructive experiments may be made by putting together a colored disc with a black, a white or a gray one. The brightness or luminosity of a color may be diminished by rotating black with it; this produces a shade such as would be seen in lessened illumination but does not reduce the hue or the saturation. The saturation may be lowered by using a white disc; the resulting colors are tints. But if a neutral gray and a colored disc of equal luminosities are rotated simultaneously the saturation will be lowered without change of hue or brightness. In short, black absorbs all colors and therefore changes only the amount of light reflected from the composite disc; white reflects all and, in effect, adds the physiological primaries to the disc; gray may be regarded as a mixture of black and white (or also, as will be seen presently, of other pairs) and is thus more luminous than black and more saturated than white. Ogden Rood succeeded in matching almost 500 colors with combinations formed of seven discs painted with the following water-color pigments, the numbers in parentheses being the wave lengths, in microns, of the corresponding spectral hues: matt white (zinc oxide), matt black (lampblack), vermilion (0.644), mineral orange (0.614), light chrome yellow (0.585), emerald green (0.521), artificial ultramarine (0.425). His formulas are given in the 'Standard Dictionary' under *spectrum*. The wave lengths of the Bradley papers are: red, 0.657; orange, 0.608; yellow, 0.579; green,

0.516; blue, 0.469; violet, 0.421. Consult also Bradley, Milton, 'Elementary Color' (1895).

Some pairs of discs produce gray which must be regarded as a shade of white, or so to say, as a dark white, due to the comparatively low luminosity of the pigments; the corresponding spectral hues, being monochromatic and of greater brightness, produce real white. Two colors whose addition produces white are called physiological complementaries; their number is unlimited. Physiological complements depend of course upon the source of illumination, for if the subdued white which they produce in daylight be examined in some other illuminant it will partake of its color. Additive combinations in general tend toward white; if actual lights are superposed the luminosity of the resultant equals the sum of the luminosities of the components, but on the color wheel the resultant has a luminosity equal to the average (weighted mean) brightness of the sectors. When the eye is stimulated to fatigue by any hue, say red, its complement is subjectively called up because the eye then sees all the constituents of white except red. Now since red and green make white, and all the spectral hues together also make white, white minus red equals green; that is, green is complementary to red.

ADDITIVE COMPLEMENTARY HUES

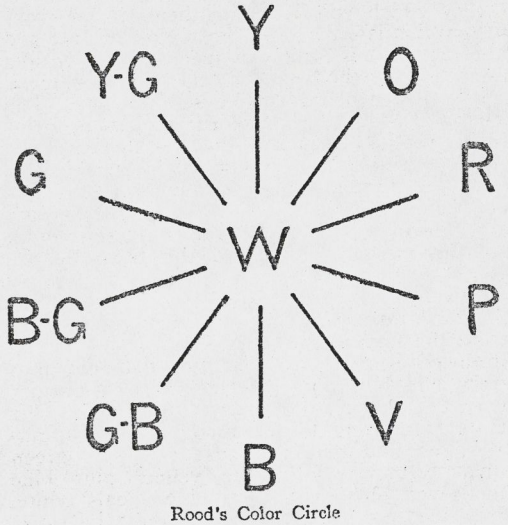
Wave lengths, μ		Colors *	
0.6562	0.4921	Yellow,	Genuine ultramarine.
.6077	.4897	Green-yellow,	Artificial ultramarine
.5853	.4854	Gamboge,	Cobalt blue.
.5739	.4821	Red,	Green-blue.
.5671	.4645	Orange,	Cyan blue.
.5644	.4618	Green,	Purple.
.5636	.4330		

* The names do not correspond to the wave lengths at the left.

Subtractive Combinations.— When two pigments are mixed each subtracts from white light those elements it cannot reflect. The resultant hue is therefore never identical with the corresponding additive mixture and is usually entirely different. It was known to antiquity that any color may be fairly matched in hue although not in purity by proper mixtures of yellow, blue, red. These are the pigment primaries; to them white and black must be added to lighten or darken the hues to be produced. The production of all colors by combinations of the subtractive primaries is beautifully illustrated in the three-color process of printing in ink reasonably faithfully copies of paintings. This work has now attained the dignity of an art *per se*. A mixture of yellow, blue and red in about equal intensities gives the effect of black because they absorb practically all the constituents of white light. If this black is spread thinly as a tint it becomes gray. In general, mixtures of pigments tend toward blackness on account of the absorption of color and thus of light.

Pigment primaries have complementaries; thus red and green, purple and yellow, blue and orange are complements and produce black or gray according to the density of the mixture. This gray is to be regarded as a tint of black, that of additive complements as a shade of white; the difference between the grays is of the utmost importance and is by no means a verbal quibble. A small amount of a color added to its complement dulls or grays the latter; such grayed hues are among our most beautiful colors and are used with wonderful effect, for instance in textile fabrics and pottery. Unusually handsome charts illustrating pigment mixtures have been prepared by commercial firms of Boston and New York.

Contrast and Harmony.— The effect which two colors have in modifying each other's hue when they are placed in juxtaposition has been determined with reasonable certainty. It can be studied by putting colored strips of paper next to each other or by placing a small piece on a larger one. The general result of such experiments is that each color becomes tinged with the complement of the other, or rather is moved



Rood's Color Circle

nearer the complement. The diagram above was invented by Rood for predicting these changes. Diametrically opposite colors are physiologically complementary. If yellow and red are placed side by side the hue of each shifts around the circle toward the complement of the other, i.e., yellow becomes greenish, red becomes more violet or less red. In the case of red and blue, the red becomes tinged with orange and the blue looks greenish. Complements intensify each other. Whether or not these effects are agreeable depends on idiosyncracy and circumstance. Red makes yellow look greenish; this may be pleasant or not — or neither — in, say, a wallpaper design. But a sallow-complexioned woman does not wear a red dress unless she wants to look bilious; green clothing would make her look ruddier unless some of the green were reflected to her face, in which case red would have been better. The question is not quite as simple as Rood's circle, for the influence of the complement is not evident when two equal areas are separated by any third color; furthermore, a small area has no noticeable effect on a much larger one. Chevreul, Rood, Church, Bruecke and others have found from examinations of paintings, ornaments, etc., of generally accepted beauty that the following pairs and triads are considered to be harmonious and pleasing.

Good pairs: red, blue; red, blue — green; orange, green — blue; yellow, violet; yellow, black.

Good triads: red, yellow, blue; red, yellow, green — blue; orange, green, violet; white, yellow, violet.

The following are to be regarded as bad:

Bad pairs: green, blue; yellow, green; violet, red; violet, blue; crimson, orange; orange, yellow.

It will be seen on comparing these combinations with the diagram that colors which do not go well together, e.g., green and blue, are adjacent in the circle while good pairs and triads, e.g., red, yellow, green, are separated. Tints, shades and grays, being less colorful or vivid, form less offensive combinations and are easier to harmonize. By generalizing the foregoing results we arrive at some of the various methods of harmonizing colors; they show rather how to avoid discord than to produce beauty.

Harmony by Contrast: use of complements in pure hues, tints, shades or grays. An example of this is the use of red (figure, chimney, etc.), in a green landscape.

Monochromatic Harmony: tints, shades and grays of a single hue as in the different greens of a landscape. This includes harmony by variation or gradation. Ruskin in *Elements of Drawing,* says "The victorious beauty of the rose as compared with other flowers depends wholly upon the delicacy and quality of its color-graduations."

Harmony of Analogous Colors: tints, shades or grays of components which are side by side or close together in the color circle, for instance in autumn leaves which contain various tones of yellow, orange, red, brown and intermediate colors. The effect is usually not pleasing when the normal hues are employed, yet the beauty of green trees, blue sky and blue-green water furnishes a striking exception to the rule.

Michel Chevreul, director of the Gobelins tapestry works, published in 1839 rules or laws of harmony which are merely detailed developments of those above. Unfortunately all such results as these are debatable, for the question of a good or bad combination depends on the individual's training and susceptibility; if he has been taught either explicitly or by his environment that this or that is bad he is likely to believe it. Association also is not without influence; "loud" clothes are considered incompatible with dignity and gaudy wallpaper is regarded as "cheap," Southern or Oriental. In consequence of this we have the strange fact that brightly colored things more often than not cost less than those more delicately colored although so far as color and design are concerned the difference in cost of production is negligible. If the prices of, say, wallpapers were reversed—the cheaper being made the more costly—it is safe to predict that a noticeable reversal of taste would take place. Other important factors which determine the beauty of a color scheme are texture of surface, quality, composition and design: thus silks, on account of their luster, may be handsomer than cottons, but the same hues in crayon, because of their lack of shine, may be better than in oils. Moreover, the difficulty with rules of taste is that they tend to create and thus to trammel it. Many interesting illustrations of actual color schemes are shown in Vanderpoel, *Color Problems.*

Strong contrast in colored signs and signals is not as closely related to legibility as might be expected. Observations on advertisements led to the following results which are arranged in the order of decreasing legibility; it is possible that they are influenced somewhat by personal equation: Black on yellow, green on white, red on white, blue on white, white on blue, black on white, yellow on black, white on red, white on green, white on black, red on yellow, green on red, red on green. (See PAINTING; PIGMENT.) Consult also Burris-Meyer, E., *Color and Design in the Decorative Arts* (New York 1935); Judson, J. A. V., *Handbook of Colour* (Peoria, Ill., 1935); Hicks, A. M. and Oglesby, C., *Color in Action* (New York 1937); Watson, W., *Textile Design and Colour* (New York 1937); Burris-Meyer, E., *Historical Color Guide* (New York 1938). (R.F.D.)

EFFECTS OF COLOR ON INDIVIDUALS

The psychological and physiological effect of color presents a moot question. Thomas Young and Hermann von Helmholtz, Ewald Hering, Michel E. Chevreul, Ogden N. Rood, and others, have contributed to the psychological and physiological theories. Considerable experiments were being conducted in the 1940's on the physiological and therapeutic aspects of painting hospital and institutional walls various hues, although not too much data are available in the way of case histories.

In the last analysis, the effect of color on the eye is the factor that makes one reject or select a paint, decorative color plan, clothing, and merchandise of all types. The use of color by the individual or industry is meant to enhance the beauty of the objects or materials used, and to make them more saleable. There is no general formula for combining color that will be successful in all instances. Color should be tailor-made for every individual problem. Good color and good design are inseparable companions, although good color can often sell a poor design. The average color card is notated for color selection only and not as a guide in combining colors for harmony, whether it be for interior decoration, or an application to textiles or paints. There are many color charts, papers, books and reference materials available, and many of these suggest how to select several hues and create a color plan that will produce an harmonious room, fabric design or painting.

Actually, there are many varieties of possible color combinations, although complementary, neighboring and monochrome color plans, with varying value contrasts, are the most used. Colors are affected by their backgrounds. By placing a brilliant red on a pink background there will be some contrast. However, the same red placed on a light blue-green background will appear twice as strong. Chevreul evolved many rules and laws of juxtaposition and simultaneous contrast, which should be applied to a specific color problem. A pair of complements used in a color plan does not presuppose that the combination will be harmonious; it only means that they are physiological complements. By looking at a red spot on a printed page for 20 seconds, and then covering it quickly with a white sheet of paper, you will view its complement, which is blue-green. This same phenomenon would give you the complements of all the hues. Several values of blue-green and a brilliant red would be a complementary combination, as well as several values of a red and a small area of blue-green. Each of these would be a complementary combination, although there is no law that would indicate one is better than the other, except its application and personal preference.

Style Trends.—The artist, industrial de-

signer and individual are all interested in the use of color as applied to painting, industry, clothing, and home decoration. There has been little pioneer work done in the use of color, although the 1947 trend showed the greatest stimulus in color coordination in fashion, industry, and home decoration. Color is a very important force in the home, school, business or industrial environments. Many industries are pioneering with color to create better visual working conditions, safety, morale and beauty. Industry has found that by using color judiciously it can reduce eye fatigue, decrease accidents, create a restful atmosphere and, in general, stimulate morale. With these considerations in mind, interiors of trains, planes, busses, etc., are carefully color styled. Red, red-purple, yellow-red, yellow, green-yellow, are generally accepted as colors that create a warm effect. Green, blue-green, purple-blue, blue and purple, are generally spoken of as cold colors, although the decorative accents or other hues associated with any of these combinations can change the overall effect.

Each industry markets its own range of colors, whether they be in artists' oils, tempera or water colors, paints, house paints, printing inks, etc. Individuals wishing to mix or match colors will find available tinting and matching charts that give proportionate formulas for popular colors that may be obtained when these basic colors are used. What industry generally accepts as a tinting stepping is created by selecting a base hue and adding proportionate amounts of white for each stepping. A little experimenting with the various bases would soon indicate what colors would be needed to mix and match a desired hue. When mixing and matching with pigments, it should be kept in mind that there is no relation between pigment and light primaries. Each pigment primary has its complement which can be used to gray it.

Color names and other confusing terms common in industry and among individuals who wish to use color as standards, or verbally describe a color, has led to the widespread use of the Munsell scales of hue, value and chroma. These scales provide a language of color, a method of notation and a standard. By using a series of symbols, describing hue, value and chroma, any color that can be seen can be notated. Consult *Munsell Book of Color,* Standard ed. (Baltimore, Md.)

There are few modern magazines, books, catalogues and other types of publications that do not carry full color pages. Such printed matter is usually produced by one of the three most popular methods of color printing, which are letter press, lithography, and intaglio. (See PRINTING.)

Color blindness (q.v.) is really a misnomer as, actually, an individual is usually blind to a hue and its complement, although the terminology color blindness would indicate that an individual sees no color. The most common form of hue blindness is the inability to see red and blue-green. Various tests have been developed for the detection of color blindness. Best of these are Professor Alarik F. Holmgren's, of Upsalla, Sweden, the *Pseudo-Isochromatic Plates for Testing Color Perception,* produced by the American Optical Company, and *Tests for Color Blindness* by Dr. Shinbou Ishihara. In a great many countries of the world there are rigid laws to prevent color-blind people from occupying positions where defective vision might endanger lives. Where acute color selection and perception is required in industry new hue discrimination tests are being developed. During World War II, partial color blindness resulted in the rejection of many individuals for exacting color work. However, many color-blind individuals have a compensating factor of greater brightness perception. This ability was utilized during the war period by using such individuals as observers on planes and various stations. They were able to pick up brightness perceptions much more quickly than the individual with average eyesight.

The world of the 20th century is more colorful as a result of many new color developments. The individual can take color photographs by the use of Kodachrome and Ectochrome films; (see COLOR PHOTOGRAPHY; PHOTOGRAPHY). Technicolor movies produce a very favorable color facsimile of the actual scene; color television seems destined in a few years to be available in every household. The plastics industries have opened up an entirely new color field, making available all types of colored products and accessories for home, business and personal use.

(L.F.)

(R.F.D.) R. F. DEIMEL,
Professor of Mechanical Engineering, Stevens Institute of Technology, Hoboken, N.J.

(L.F.) LORAIN FAWCETT,
President, Allcolor Co., Inc.

COLOR BLINDNESS, *Achromatropsia,* popularly known as *Daltonism,* a singular affection, producing an inability to distinguish one color from another, and in certain rare cases to discern color at all, the eye perceiving only light and shade, or black and white. Although recognized for centuries, its modern study dates from the time when the famous English chemist, John Dalton, brought it into notice by publishing in 1794 an account of his own case as marked by this peculiarity. Later George Wilson of Edinburgh studied this phenomenon, and collected many striking instances. From the result of these investigations it would appear that color blindness is much more common among men than among women, and that of the former 1 in 20 is unable to discern the nicer shades of color, and 1 in 50 to distinguish certain primary colors from one another. The colors most liable to be confounded are red and brown with green, purple and green with blue, red with black, light hues of all sorts with white, and dark shades with black. Color blindness may be either congenital or acquired. The latter, believed to be an affection of the optic nerve and retina, may result from disease or accident and may be caused by the excessive use of tobacco, alcohol or other drugs. It sometimes happens that persons having contracted color blindness may be able to distinguish colors accurately when they are near at hand, while they are not able to do so when they are at a distance. Congenital color blindness is frequently hereditary and generally exists in both eyes. Sometimes it exists only in a slight degree, at others it is found in a marked degree, while in others it is complete; generally, however, it is only partial; that is, the person affected fails to distinguish properly one or two of the fundamental colors, red,

Fishing

When Fish Are Finicky
plus The Tale of the Long Eddy Monster

BY ED ZERN

What's a carp doing in a column that's usually devoted to trout, salmon, and other noble types? The answer, plus other good stuff, follows

Fishing, I keep telling anyone who will listen, should not be a competitive sport. But when my friend Homer, whose circumference is 3.14159265 times greater than his diameter and with whom I was sharing the stern end of an 18-foot sportfishing cruiser, caught his fourth fish as opposed to my zilch, I demanded to know how he was doing it. "It's as easy as *pi*," Homer said, hauling in another bonito. Both of us had come to Contadora, one of the numerous and beautiful Pearl Islands lying about 20 miles off the Pacific coast of Panama, to attend a meeting of the Braniff Outdoor Council. But Homer had had the wit to bring along his bass-fishing tackle while I had mistakenly assumed we'd be fishing for sails and marlin. "*Pi* my eye!" I said. "What lure are you using?"

"It's one of Cotton Cordell's Redfin series," Homer said, "and just to prove it's purely a matter of skill, here's one that's almost identical." He reached in his tackle box and took out a 3-inch Redfin that almost, but not quite, matched the color of the one he was using. When I had tied it on we resumed trolling, but after Homer took another bonito and a scrappy amberjack, I suggested we trade lures; when Homer said he'd rather switch than fight, we did so.

Ten minutes later, when I had taken three fish to Homer's none, he pawed around in his tackle box until he found another battered Redfin identical to the one that had scored so well. From that point on, oftener than not, both of us had fish on at the same time, and when our arms and wrists ached from playing fish into the boat for release, we headed back to the dock.

I don't think it would have been possible to tell the successful plug from the unsuccessful version at a distance of 10 feet—they were identical except for an almost imperceptible variation in color—but for some reason which no one who is not a bonito or an amberjack would understand, there was a great deal of difference in the results they produced. Probably other lures would have taken fish that morning if we had had the lures and the time to test them; one reason fishing will never be an exact science—for which let us all be thankful—is the impossibility of setting up controlled experiments. But I think we had demonstrated, at least to my unscientific satisfaction, that the tiny variation in color had made the difference between lots of fish and no fish at all.

Then there was the time I drove up to Blackville in New Brunswick and spent two days fishing the Miramichi without getting so much as a touch from a salmon. After lunch on the third day I telephoned my friend Paul O'Hair, who was then the owner and proprietor of the Doctor's Island Club a dozen miles or so downriver, to say hello. When I told Paul I hadn't seen a fish taken in two days he said, "Get yourself down here as fast as you can—we're taking limits of fish every day, and some good ones. Your friend Jack Rowles had three this morning."

When I got down to the club, Paul told me that the fishing was easy, but that the salmon were taking only a black hairwing fly with an orange tag. He said there was a three-day wait for these flies from the local tyer, but offered to give me the last one from his own box. I told him I had several flies in my jacket so similar that there'd be no point in taking his—the only difference was that mine were tagged with red wool instead of orange. I pulled on my waders, walked down to the river, and found Rowles busily battling a 12-pounder. After I netted it for him and we exchanged greetings he insisted I take the good water he had been fishing while he moved downstream. When Jack caught and released two more salmon, we compared flies, and the only difference visible to either of us was that the tag of his fly was reddish orange while mine was a bright scarlet.

"Let's try something," Jack said, and when we had switched flies, I stepped into the river and was fast in a 9-pound salmon on my second cast. I took a grilse and another salmon while Jack was taking none, but three minutes after he had tied on another of his orange tags he again began catching fish.

Was it luck? Mere coincidence? Nobody can prove that it was or wasn't, but I'm sure any veteran fisherman who uses artificial lures can recall at least a few instances in his experience when the same situation arose. Personally I'm satisfied that in these and many similar instances it was not a matter of happenstance but some subtle variation in color or conformation or action that made the difference, and I think the moral is clear: *Carry a substantial selection of flies and lures and keep changing them until you find the one that works.* (Not exactly a revolutionary precept, but how often have you met a fisherman with no fish who shows you a spoon or jig or plug or fly and says, "If they're ever gonna start biting, this is what they're gonna take." Don't you believe it!)

Even when you're trying to match the hatch, realize that no two tyers tie exactly the same version of a particular pattern, and that there may even be subtle differences between two flies of the same pattern tied by the same person. (Probably this applies more to wet flies, nymphs, streamers, and lures than it would to dry flies; trout usually rise to the

Southwest. In some parts of the Rockies, for example, you couldn't even get into good bear country in April because of snow. May and June usually see the most activity. One of the best hunts I ever made was in June in the Wyoming high country.

Booking with a reputable guide is the best plan. In baiting country, a guide gets a bait put out early, or locates natural baits. On that Wyoming hunt, I killed a bear that was going to the carcass of a winter-killed elk the guide had located. In places where baiting is not legal, a guide is all the more important. He knows the country and can do the sign scouting long before the hunt dates.

Frankly, I don't feel that baiting is the least bit unsporting; no more than sitting on a deer stand where you know a buck crosses. The wariness of bears coming to a bait is legendary. Their eyesight is poor (except for detecting motion), but their scenting and hearing abilities are superb. The drama of watching an animal come in—or suddenly appear—is overwhelming. When you can see, as sometimes happens in the mountains, a good one swagger across a meadow, you wait and shake until, by the time it's in range, you couldn't hit the ground with your hat. That experience will break down any hunter's prejudice against a bait!

Natural "baits," are often as effective as baits that are purposely placed. One of the best is a beaver pond and house. An old man in Quebec who had trapped scores of blacks once told me that his favorite set in the spring was near a beaver house or dam.

"Bears can easily catch beavers," he said, "and this is one of their favorite meals. A big bear will come back time after time to a beaver house where he has missed his prey."

THIS old gentleman's favorite stakeouts were of two kinds. One was the vicinity of a beaver house with bear sign around it. The other was the carcass of a bear he had trapped and skinned. He claimed that the carcass of a young bear—especially a yearling—was the best bait ever to lure in a big trophy. When he guided two or more hunters, he said he always had one hunter, whose tag was not yet filled, watch the carcass of the first one killed.

"Far from scaring off another," he told me, "if there's another around, it'll bring him in—and he'll eat it."

One distinct advantage of bait is that the tracks around it can be checked to make sure what is coming to it. For example, a guide I was with one spring in the Rockies nixed a setup near a dead mule deer because tracks plainly indicated that a sow with two small cubs had been coming to it. You must be certain no small cubs are with an adult.

Bear cubs require parental care for a rather long period. I have seen tracks indicating, for example, that the bears using a certain area were undoubtedly a mother and one or two yearlings. Most youngsters stay with the mother through their first winter, denning with her. By the time they leave the den that spring, they look almost adult, and usually wander away during ensuing weeks. Perhaps because of this long association with young, the female skips a breeding year, sometimes two, not coming in heat again until at least two years from the early summer when she was last bred.

Hunters in parts of Wyoming and Montana must look sharp, in addition to the cub problem, for the rare possibility that a bear seen in poor light or screened by brush may be a "protected" grizzly. The dished-in face, the shoulder hump, the silvery or yellowish hair tips easily distinguish the grizzly. So does size, as a rule, but a yearling grizzly might be mistaken for a big black, and that would be a serious mistake indeed.

The experienced hunter is always alert to varied bear signs. Tracks have obvious importance: big track, big bear. If you find plainly printed tracks, you can judge quite well the size of the bear that made them, and whether or not you wish to hunt this territory or look for a bigger track.

Bears commonly make deep scratches in trunks of good-sized

(Continued on page 186)

Re Colt

Box 121
Gardiner, Mt. 59030
Feb. 2, 1976

Dear Datus:—

I have been about to write you several times lately but every time I thought I had better read the chapter in color again before doing so. It is well done and I do not feel adequately competent to criticize your work.

I believe that the one case in my experience when the actual hue of the fly was as important a factor as when I was fishing for Dolly Varden in a salmon river in S.W. Alaska. I walked down the trail looked into the stream and saw lots of salmon. It was a short stream so the fish were spawning not too far from the salt water. They didn't

looks too appetizing so I decided to try for Dolly's which I had heard usually run up to eat a few loose salmon eggs. So I tried several different wet flies with no success until I put on an old squirrel tail which had an orange body just ~~bet~~ the color of a salmon egg. From then on we had beautiful fresh run Dolly Varden to eat.

The Kichatna Trout are far more selective now than they were in the 30's but they aren't a darn bit smarter. Those old "bank feeders" were as tough to take as a trout can get at certain times. If they were not sure that anything dropping onto the water was not a bona fide, real, natural article of food they took off like nobodys business and there was no fooling them

unless the fly was seen with no hint of leader. Now its a different story, as the fish are far more selective and will probably continue to become more so as time goes on. Now here is where the aspects of color will become more & more important & imagein.

Why is the so called Coachman Trude so darn effective during the grasshopper season. Certainly the colors of the fly are not those of a grasshopper. It must be the general shape of the fly and the way the sun comes thru the white bucktail wing — with the  body and hackle doing the rest of a good silhouette job.

I'm not so 'hep' on the exact color of a fur dubbed body for nymphs & wet flies as I am on the kind & character of the fur. With me

muskrat, otter, beaver are good furs for dubbing and many others such as our native rabbits etc just don't have the right appearance and or translucency to compete with say muskrat (which is by far my favorite).

As you say, "Fly-fishing might never have got a beginning if close color imitation had been necessary", but the related qualities of color must have considerable bearing on the effectiveness of a fly.

Value is very important ~~to~~ in my opinion. ~~or~~ When the proper value is reached the original hue ~~can be~~ becomes less important. ~~as to~~ Value can be altered by tinting & shading.

To really match the ~~spectrum~~ color of an insect the intensity will necessarily be altered by a mixture of ~~more than~~ two or more hues and

then brought to the proper value
by the addition of white or black or
the addition of a suitable substitute for them.
Good fly tying materials experts
must therefore be as adept in
dying feathers as the artist must
be in mixing his paint.

Enough of this — as you know
what I've said as well as I do.
Put 2 nice cutthroats on an 18 very
dark B-O. Wooly Worm day before yesterday
at the mouth of the Gardiner.

We are sure enjoying the
tea many thanks, a belated congratulations
to you & Anna and a hello to Bates Jr.
Tell him the country is loaded with
elk antlers now as the late hunt
is still on.

With best wishes, I am
As Ever
Scotty

Color Perception by Salmonid Fishes

by Sherwood E. Peterson

The study of color perception in fish, especially in the salmonids, is a relatively new field, with little physiological evidence to support or disprove the ability of the trouts, salmons, chars, and graylings to perceive color. In contrast, however, considerable work has been accomplished in conditioning such fish with colored light under varying light conditions. Such conditioning offers a wide range of mostly supporting data, though subject to some criticism from the more rigorous scientific community.

Color vision and eye physiology in fishes, particularly the salmonids, have long interested me, if only in the fact that they may affect angling success. Indeed, color of artificial flies in angling for the trout is often appropriately or inappropriately blamed for angler success or lack of it.

Ask an angler whether fish see color and the answer will be an immediate yes in all but rare cases. It apparently is true. Fish do see color, with the exception of the sharks and rays (none of which have visual cones and therefore can determine differences only in light intensity and shade) (Fitzgerald, 1968; Brown, 1957; Bridges and Yoshikami, 1969). To check the validity of the argument, a brief look into the physiology of the eye in general and the fish eye in particular is in order.

There are two major types of visual cells on the sensory layer of the retina in the human eye. These cells, the rods and cones, are peculiar in that the rods are insensitive to color but highly sensitive to brightness. In contrast, however, the cones, in bright places, relieve the rods and function to distinguish color. As light intensity decreases, rods replace cones and color perception decreases proportionally with intensity (Salmon, 1952).

Trout eyes have both rods and cones, and, similar to human eyes, in a trout eye there is one place, front and center, where cones are nonexistent. Thus, color vision, by virtue of this deficiency, is impossible in that particular area (Bridges and Yoshikami, 1969; Salmon, 1952). Such an area of insensitivity to color accounts for the inability of salmonids to distinguish color when a colored object, say an artificial fly, is placed between the area of insensitivity and a bright light, say the sun (Figure 1).

In contrast, fishes have an area centralis (Figure 2) where cone density is greater than elsewhere on the sensory layer of the retina (personal communication, Dr. William McFarland, Professor of Zoology, Cornell University). This area is most common in diurnal fishes, including the salmonids. Looking at Figure 2, color perception should intensify as light enters from the medial portion of the eye. That light entering from the lateral portion might readily fall on the area of relative color insensitivity. Dr. McFarland notes that pure cone retinae are rare among veretbrate diurnals.

Fishes tend to be either nocturnal or diurnal, but salmonids, especially large trout, may readily exhibit both qualities. They have excellent night vision, yet exhibit color differentiating qualities in daylight. Night vision, because the rods are used extensively, cannot distinguish color, just variations of gray (Skues, 1949; Salmon, 1952; Bridges and Yoshikami, 1969).

Such a superficial treatment of eye physiology is unavoidable, partially due to its complexity but also to the nature of this endeavor. It is more useful to the angler to deal with the ability or inability of fish to perceive color, rather than to explore in detail how and why salmonids distinguish color.

Eye physiology plays an important role in color perception, but wave transmission through the medium is significant. If it were not for light transmission or the lack of it through the watery medium, salmonids could receive little color stimuli. Since various water types typically absorb differing wave lengths, color perception and eye adaptations to it will vary between marine and freshwater fishes (Bergman, 1943; Brown, 1957; Bridges and Yoshikami, 1969).

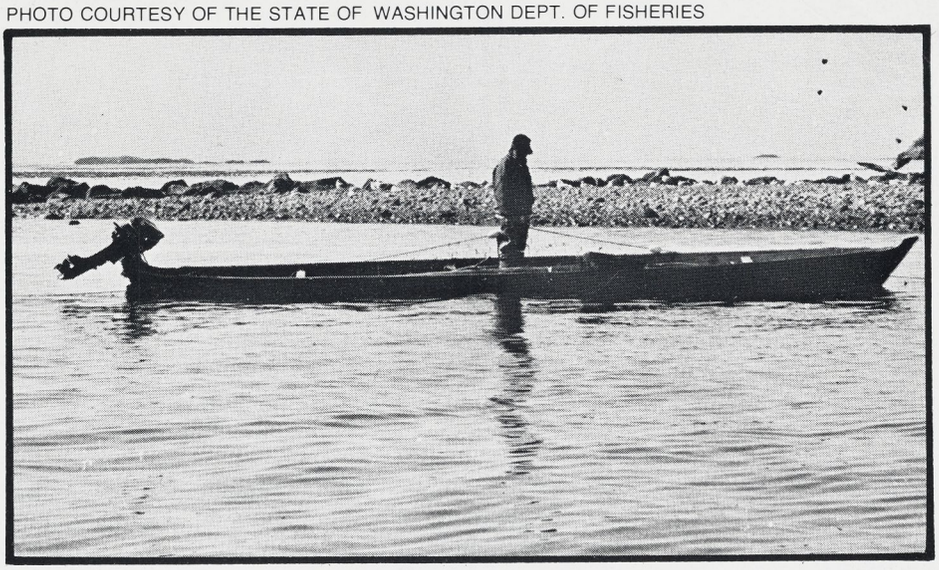
Owing to varying degrees of absorption of light, freshwater fish have pigments displaced toward the red end of the spectrum, corresponding to the red light found in such environments. Porphyropsins, types of visual pigments, absorb red light, and typically are found in freshwater fish. In contrast, rhodopsins are found in marine fishes and tend toward absorbing the blue end of the spectrum. This may seem unimportant, but often rhodopsins and porphyropsins are found together in fishes.

The presence of both pigments leads us to the problem of which end of the spectrum anadromous salmonids might perceive, the red, the blue, or both. Bridges and Yoshikami determined that in such cases the migratory transition to freshwaters is accompanied by a switch to porphyropsin, making perception of the red spectra enhanced. On the return trip to the sea, the reverse occurs leading the porphyrops in to revert to rhodopsin with a consquential increase in perception of the blue end of the spectrum (Bridges and Yoshikami, 1969).

Several methods have been developed and commonly used to study color vision in fish. The colorimetric method, developed by M. M. Bongard and M. S. Smirnov, is based on a comparison of bioelectric activity of the optic nerve and retina with the action of changes in the field of vision of the colorimeter. If the eye does not see the border between the fields of vision of the colorimeter presented to the fish the "action currents" do not appear in the optic nerve or in the retina. Bongard and Smirnov, 1955, gave the following definition of color vision: "The eye does not differentiate the given color if a ratio between the two colors acting alternatively can be found at which no action currents occur." Conversely, "at all ratios between the intensities of two colors, action currents do occur; it is assumed that the eye of the animal differentiates these colors" (Protasov after Bongard and Smirnov, 1955). This method allows one to study the capacity of the eye to differentiate colors and light intensity. This is quite in contrast to other methods commonly employed where variations in light intensity might alter the results.

Methods of study through conditioning are often not so precise, for in unconditioned fish the lack of a differentiating response when subjected to a choice of two colors cannot be interpreted as the

PHOTO COURTESY OF THE STATE OF WASHINGTON DEPT. OF FISHERIES



The Indian Fishing Controversy in the Pacific Northwest

by Anthony Netboy

On June 4, 1975, the 9th U.S. Circuit Court of Appeals upheld the 1974 decision of U.S. District Court Judge George Boldt that fourteen Indian tribes in western Washington were entitled to half the harvestable steelhead trout and salmon which came up to "their ancient and accustomed tribal fishing areas," a decision which has thrown the state fish and game agencies into confusion and virtually rendered impossible management of the resources on a sound and scientific basis.

"I'm tremendously pleased," said Judge Boldt when he learned of the decision, but non-Indian commercial fishermen and sports anglers did not cheer — to the former it spelled catastrophe and to the latter it meant there would be fewer opportunities to take their limits of salmon and steelhead.

The Indian fishing controversy originated about fifteen years ago, first on the Columbia River and then in western Washington. In 1957, when the Dalles dam was completed by the U.S. Corps of Engineers, four tribes — the Umatillas, Yakima, Nez Perce, and Warm Springs, who fished at the ancient sites at Celilo Falls, were paid $23 million for their rights by the federal government. The Columbia River above Bonneville was then closed to net fishing but the tribes were allowed to take salmon for subsistence and ceremonial purposes.

For a few years the Indians abided by the regulations and then began to fish with nets above Bonneville and sold their catches — in defiance of the law. Efforts by the State of Oregon to negotiate reasonable settlements were unsuccessful. Of the four tribes only the Warm Springs Indians remained faithful to their agreement with the federal government. From 1960 to 1965 salmon harvests by the Indians in the area closed to commercial fishing jumped from 45,000 to nearly one million pounds.

In western Washington various tribes, emulating those on the Columbia, began to fish with nets on streams where angling only was permitted, taking not only salmon but steelhead trout, which is legally a game fish in the state and cannot be sold. Indians were arrested in both states for defying fishery regulations but usually they were not found guilty by the courts.

In 1968, Indians fishing the Columbia filed suit in the U.S. District Court in Portland for an injunction to prevent enforcement of state regulations. The brief submitted by George Dysart, assistant regional solicitor of the U.S. Department of the Interior, cleverly argued that the $23 million paid to the tribes did not deprive them of their right to fish at their accustomed place under the 1855 treaties with the federal government, because it was payment only for "essentially a flowage easement over these areas." In other words, the rights guaranteed by the treaties still prevailed and they could hang their nets "in the usual and accustomed fishing places to take fish free from interference by the state or others." The only restraints they recognized were those necessary for conservation of the resource, and then only the tribes themselves could set the regulations, not the states.

Federal Judge Robert C. Belloni accepted Dysart's arguments and ruled on October 10, 1969, that the State of Oregon "must regulate the taking of fish so that, except for unforeseen circumstances beyond its control, the treaty tribes and their members will be accorded an opportunity to take, at their usual and accustomed fishing places . . . a fair and equitable share of all fish which it permits

CONTINUED ON PAGE 34

absence of an ability to differentiate between the colors. It quite probably is the result of attaching little or no significance to the difference. Thus, preconditioning by training to associate color with food is generally employed (Brown, 1957).

I have used the latter method but have found it to be inconclusive in a rigorous sense, because it is not entirely free of objectionable features. Fatigue and adaptation may readily enter into the results, modifying them accordingly. Unsuspected stimuli are often introduced unknowingly and much to the dismay of the experimenter.

My aquaria studies have shown with some variation that brook, brown and rainbow trout could be conditioned with colored lights. It was found that many conditions entered into the experiments and that the results should be considered only in that they show definite trends. Light intensity throughout the experiment was neglected through lack of more sophisticated equipment. This may have adversely affected the results.

In any event, the method used was somewhat primitive and is included only to supplement other information and perhaps to demonstrate the possible problems and pitfalls concerned by drawing conclusions with less than rigidly controlled, highly sophisticated lighting equipment.

Three twenty-gallon aquaria were used with ten brook, brown and rainbow trout in the aquaria, one tank for each ten individuals of each species. At the far ends of each aquarium were suspended four incandescent bulbs, red, yellow, green, and blue. For one complete month the trout were subjected to red and blue lights only. At one end, the red light was turned on at feeding time. At other indiscriminate times, the blue light was often turned on, with no food available.

It was nine days before any response was witnessed toward either light. At that time, the fish could not differentiate between the lights. It was apparent however that they could recognize a source of illumination, either source served well to stimulate them. After three weeks, it was apparent that the fish of all three species (except two brown trout fingerlings) would respond well to the red light and usually ignored the blue. At the end of the 31-day period, all fish ignored the blue light; yet, at times, some fish, especially the brown trout fingerlings, would ignore both lights, regardless of feeding. It was, however, noted that generally the rejection of food and failure to respond to the red light followed closely the feeding behavior of the same species of trout held in three rearing ponds out of doors, indicating possible influence by pressure and weather conditions.

Despite these apparent discrepancies and variations in behavior, it was obvious that either color or intensity of the colored light bulbs was differentiable by the trout. Thus, for the second month the same fish were subjected to stimuli from four lights, red, yellow, green and blue.

The feeding actions remained the same, with trout being rewarded with food for responding to the red light and receiving neither positive nor negative reinforcement for responding to the other colors. It was only on rare occasions that an

CONTINUED ON PAGE 31

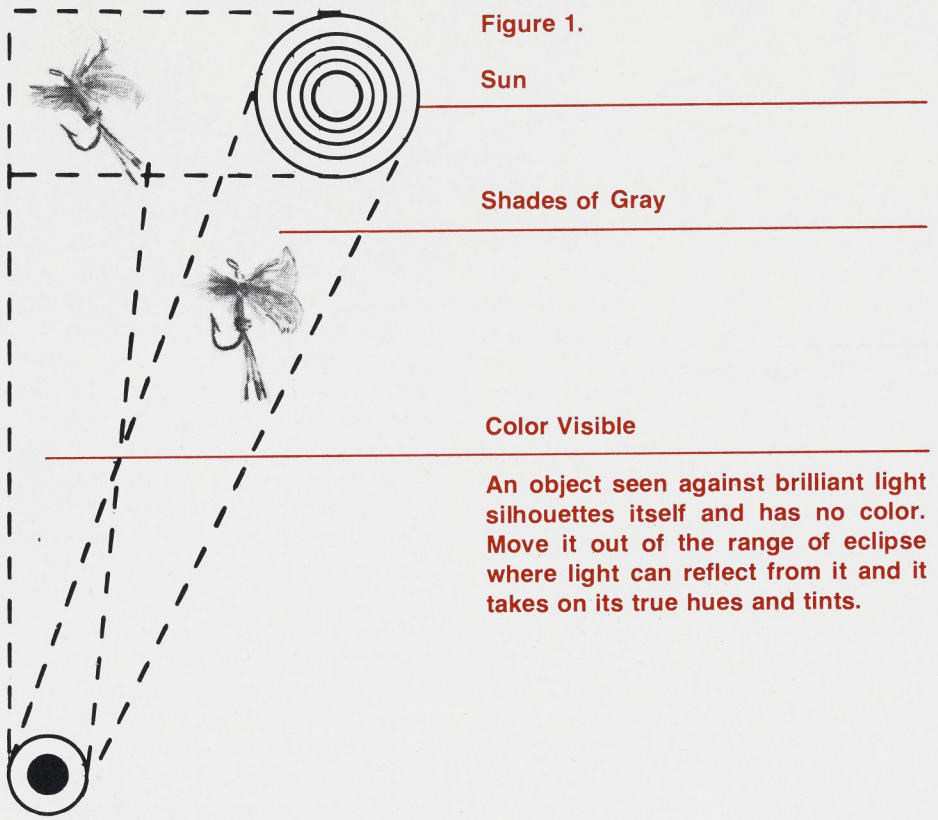


Figure 1.

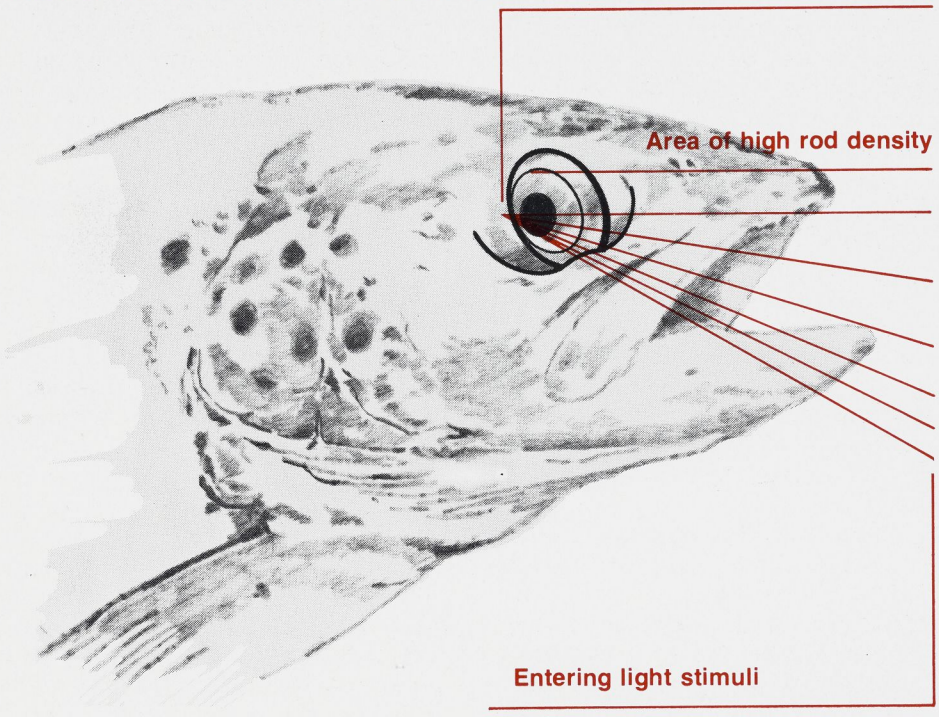


Figure 2. Salvelinis fontinalis imaginarius

Trout Fishing in KENYA

CREDIT T.S. AIKMAN. MORGAN ORR & ASSOC. (K) LTD.

Although Kenya straddles the equator the country's vast uplands have the low temperatures and clean mountain water that are ideal for trout. Both the rainbow and the brown trout in Kenya provide excellent sport.

Because of the climate, trout are found only at high altitudes in Kenya. The rainbow is found in highland areas at altitudes between 6,000 and 10,000 feet, while the brown trout is found in streams in moorland areas above 10,000 feet. The brown trout is much rarer than the rainbow, and the fact that the rainbow's haunts are easier to reach helps to make him the main attraction for Kenya anglers.

The average life-span of a trout in Kenya is four years, and generally the larger fish are found at the lower altitudes. The rainbow in Kenya average between one and two pounds but much larger fish,

CONTINUED ON PAGE 32

the fish habitat of our rivers. Each one has changed river or stream fishing into impoundment fishing.

The Corps has plans for hundreds more that will take their additional toll of our fishing waters. These plans have no place in them for the stream fisherman.

Is it impertinent to ask whether it is not about time for someone to take a good, close look at the Army Corps of Engineers to determine whether its principles and objectives are really in tune with the needs of the times and the rights of thousands and thousands of dedicated fishermen?

Dr. George Codding
Dept. of Environmental Population
and Organismic Biology
University of Colorado
Boulder, Colorado

SOMEONE FAILED

Having been a TU member since April, 1974, I was surprised when I just received my first copy of *Trout*. I got volume 16, no. 3. I figure you owe me the previous four or five copies.

Things like this and the fact that my chapter informs me of meetings on the average of two days after they are held, could be a couple of reasons why members don't renew.

Billy J. Jackson
Albuquerque, N.M.

HELP FOR YELLOWSTONE

As a property owner on the banks of the Yellowstone River I am grateful for your story, "Stop the Allenspur." We shall need the help of residents of the entire United States to make certain that our River remains free flowing.

There has been a change in authority over the River, however. On January 22nd of this year the Army Corps of Engineers took over the jurisdiction from the Bureau of Reclamation. This is fortunate in some ways, although the secrecy surrounding the change made us suspicious. It takes forever for the Corps to grant permission for any work on a waterway it controls. Besides that there would surely be public hearings here in Park County which would demonstrate the opposition to the project. The value of the Yellowstone left in its present condition must be balanced against the loss of ranch property, of roads and a railroad to be relocated, the loss of a tax base, and the air-conditioning desired in urban centers.

We will welcome all of the help that Trout Unlimited members, as individuals, can give us in Congress. If it reaches the hearing stage, you might even come out here. The trout are still everywhere.

Urana Clarke
Livingston, Montana

ATLANTIC SALMON RESTORATION

The Atlantic Salmon Restoration Program on the Penobscot River, Maine, has achieved greater success in 1975 than almost anyone expected. I've always been optimistic about it but what has happened this year is something like the Boston Red Sox winning the World Series.

Close to 500 salmon have been counted at the Bangor Salmon Pool fish trap as of July. The long-abandoned Penobscot Salmon Club has reopened and logged a rod catch of 55 at this writing. This is ahead of the final totals for 1974.

Curious spectators crowd the pool to watch anglers or observe *Salmo Salar* jump the falls of the low dam at high tide. Salmon Commission workmen tag salmon in the trap each day and check the count before emptying it.

Releasing or removing the fish is a good idea as poachers have come to life and break open the trap occasionally to rob it of these magnificent creatures. The cost of the program on the Penobscot alone is $1,200,000, much of it federal funds. Salmon are like Fort Knox gold. Stealing them is hardly a game-law violation any more. At these prices it's grand theft.

On the Narraguagus River, the rod catch at this writing is over 100.

The state wants its share of the bonanza, too. In 1976, a season nonresident fishing license will cost $25.50, a jump of $10. The Atlantic salmon stamp, new in '75, costs $15. Resident licenses will increase, also.

George Linnane Cranston, R.I.

---

individual fingerling would respond to the blue light, perhaps, a gesture of curiosity or confusion. This pattern was similarly displayed when the green light was on. The red light as usual encouraged generally good responses, except on occasions already noted. It was however interesting to note that trout of all three species, when subjected to the yellow light stimulus, repeatedly responded to it, apparently mistaking it for red.

At that time, no apparent reason was available for this lack of discrimination, but upon researching for this particular paper, it was noted that similar responses, using colored tubes, were typical when conditioning trout to light (Brown, 1957).

To correlate the foregoing with angling success and how the rising salmonid might inspect the feathered offerings, it is found that trout, salmon, char and grayling perceive color in natural flies, i.e., the ephemerids, plecopterids and trichopterids, to name but a few; yet it also is found in field experience that the salmonids selectively discriminate between varying colors of artificial flies as well as naturals. Such discrimination and differentiation of fly patterns by salmonids has often led to frustrating days astream, changing pattern after pattern to induce a rise from the seemingly uncatchable trout. It has been my experience that color rarely plays this much of a role in inducing a trout or grayling to rise, and this has been my experience in fishing for trout, salmon, grayling and char in Ontario, Vermont, New York, Pennsylvania, the mountains of Georgia, Washington, Oregon, and Alaska. There has been little exception to this, and when exception has occurred it has generally been in wilderness or areas where fishing pressure is light. Often in lightly fished areas salmonids exhibit strange behavior to an angler versed in standard eastern United States trout angling, for they may readily accept and even prefer the wildest of colors.

Striking examples of this behavior are apparent in salmon and steelhead angling where the iridescent orange and red flies often account for the greatest catches. In the wilderness of Alaska and in the mountains of Washington, wild brook trout, cutthroat, rainbows and Dolly Varden generally offer great sport to those anglers offering a wide range of gaudy colors, preferentially orange and red. Identical patterns in the eastern United States would quite generally be ignored in preference to closer imitation of the natural insect. This is not to say nor to infer that

CONTINUED ON PAGE 37

including several weighing 12 pounds, have been caught in dams at the lower end of the rainbow's altitude range. The trout tend to grow to larger sizes in dams than in the rivers.

The most popular trout-fishing areas are in the Aberdare mountains and on the slopes of Mt. Kenya. This area is easily accessible from the capital, Nairobi, over excellent roads. It is also easy to fly the 100 miles or so from Nairobi to the Aberdares, where there are several airfields close to the trout-fishing areas. Trout are also plentiful on the Mau Escarpment, particularly at Kericho, in the Cherangani mountain range and on Mt. Elgon, which rises to over 14,000 feet in western Kenya.

Some of the best stretches of the trout-stocked rivers and streams belong to private farms, or are leased to hotels and clubs for fishing purposes. One of the best-known haunts of Kenya's trout-fishing enthusiasts is the Ngobit Fishing Lodge, with accommodation for 12 people, on the slopes of the Aberdares. Nearby is the Ngobit Trout Farm, a private venture.

The Izaak Walton Inn at Embu and the Tea Hotel at Kericho have their own stretches of good trout streams, and there are also several fishing camps, consisting of comfortable huts with basic furniture and cooking facilities, where the visiting fisherman has only to take his own bedding and food to be fully equipped — and on the spot for some superb fishing.

A trout fishing license in Kenya costs 40 shillings a year, 20 shillings for a month, ten shillings for a fortnight, or five shillings for two days. These charges have remained unchanged for many years and represent excellent value for the fisherman. Licenses are obtainable from the Fisheries Department (P.O. Box 40241, Nairobi) or from revenue offices in Nairobi and in other centers throughout Kenya. A license gives the fisherman the right to fish in any streams and rivers in Kenya — private waters excepted, of course, although it is often possible to get permission to fish these from the landowner concerned.

The use of all natural bait is forbidden, as is the use of a lure with more than one hook. The flies used by Kenya's trout fishermen are slightly larger than those used in Europe. Most popular are the Royal and ordinary Coachman, Black Gnat, Kenya Bug, Mrs. Simpson, Alexander, and Watson's Fancy. All these are readily available in Kenya.

Kenya law states that trout may not be bought, sold, bartered or exchanged, and a bag limit of six fish per day applies. These are among the measures taken to protect Kenya's trout fishing and to ensure that it continues to provide good sport for the angler.

Trout fishing in Kenya is seasonal, and the best times of the year are from December to March, and from late August to October when dry weather can be expected to give clear water. However, even in rainy seasons the mountain streams clear very quickly, and good fishing can be enjoyed in these conditions after a comparatively short spell of dry weather.

The seasonal aspect of trout fishing in Kenya is less crucial than it is in many other parts of the world. Being on the equator, the country has no significant temperature variations throughout the year. Although temperatures tend to be lower during periods of rain, they quickly rise with the return of sunny conditions.

Much is done in Kenya to protect trout fishing. Poaching is a serious problem that necessitates constant surveillance by the Fisheries Department. It is also part of the department's duty to persuade farmers not to cultivate land close to the water, as this would increase the chance of soil erosion, with the resulting clouding of waters which would otherwise be clear. Of course, many miles of trout streams run through forest areas, or through uncultivated areas of land belonging to the state, and here the waters are naturally protected from the danger of erosion.

Generally speaking the country's trout-fishing facilities are far from fully utilized, and there is no fear of this situation changing in the foreseeable future, despite a growing interest in Kenya's fishing facilities.

well as they can with the new situation. "It will take Indians between five and ten years to approach the 50 percent figure cited by Boldt," says Forrest Kinley, a Lummi tribal leader. They lack capital and expertise, especially for offshore fishing the rights to which they now also lay claim. Donald Moos, director of the Washington Department of Fisheries, says he is trying to enforce the Boldt decision, "trying to be something of a peacemaker."

The agencies are monitoring the rivers to see that the Indians do not overreach themselves, admittedly a difficult job. For instance, last January the Washington Game Department, acting on information from fish buyers that the Indians had already taken more than half their allocated share of the steelhead on the Green River, one of the best in the state, ordered them to take out their nets. In January also the Washington Game Department informed the Nisqually tribal council that 50 percent or more of the steelhead had already been harvested on the Nisqually River and ordered it to close the net fishery. The council complied.

How will the controversy end? The gillnetters and seiners hope that the U.S. Supreme Court will overturn the Boldt decision, but this is generally regarded as improbable. In the long run only Congress can straighten out the fishery mess by rewriting the 19th century Indian treaties which are now being used by the Indians throughout the United States to persuade the Courts to uphold their alleged rights to fish, land, and other resources taken from them.

In his letter to Congress, Dr. Harville said: "It would be to the benefit of all our citizens if Congressional action could end these escalating claims and counterclaims, and permit our management agencies and fisheries user groups to concentrate their energies upon conservation and wise use of anadromous fish resources." The vast expenditures in salmon and steelhead conservation — it is estimated at $300 million on the Columbia River — are in jeopardy if the declining runs are not properly managed.

Congress, however, is notoriously slow to act, especially when a wave of pro-Indian sentiment is sweeping the country.

eastern fish will not at times exhibit the same qualities. Wild brook trout often attack gaudy-colored flies like the Parmachenee Belle and the Silver Doctor. This is typical in portions of the Adirondacks, Ontario and Maine, where brook trout might show tremendous affinity for bright colors.

Generally salmonids perceive hue to varying degrees, often differentiating hue better than the angler, tending to reject imitations that may appear identical (when viewed by the human eye) to the natural insect. This is not often the case and I feel that presentation of the feathered imitation is still the most important part of the game, since surface distortion, light intensity and direction, coupled with the trout's blind spots, rarely make minor differences in color especially antagonistic to our efforts astream.

Literature Cited

Bergman, R., 1943. *Trout,* pp. 295-297. Alfred A. Knopf, New York.

Bridges, C. and S. Yoshikami, 1969. "Distribution and Evolution of Visual Pigments in Salmonid Fishes," pp. 609-626. *Vision Research,* Pergamon Press, New York.

Brown, M., 1957. *Fish Physiology,* pp. 121-141. Academic Press, New York.

Fitzgerald, B., 1968. "The Senses of Fishes," pp. 57-67. *The World of Fishes,* Pelham Books Ltd., London, Eng.

Fox, C., 1967. "Vision," pp. 25-32. *Rising Trout,* Foxcrest, Carlisle, Pa.

Protasov, V., 1962. "Studies on Vision in Fish," pp. 217-229. *Techniques for the Investigation of Fish Physiology,* E. Pavlovskii, Chief Editor, Academy of Sciences of the U.S.S.R. Ichthyological Board, Moscow.

Salmon, R., 1952. "The Senses of Trout," pp. 14-33. *Fly Fishing for Trout,* Greenberg Publisher, New York.

Skues, G., 1949. "The Vision of Trout," pp. 10-43. *The Way of a Trout with a Fly,* Jarrold and Sons, Ltd., Norwich, Eng.

Sherwood E. Peterson is a Research Biologist with Ichthyological Associates, Inc. Dr. Peterson advises that "I have modified the article into a sem-popular style which might benefit a greater number of readers". We recognize the article is a little more scientific that some but a must for the avid match-the-hatch fly angler.

ARMSTRONG SPRING CREEK

Some people despair, like the man from California. But others, like Dennis Workman, a fish biologist, say the flooding and scouring may have been beneficial for Armstrong, helping the insect life, the fish, and the fishing.

"It (the stream) looks pretty tough, but we sell nature short when an unusual thing like this happens," Dennis Workmen says. "I think it's more a beneficial thing than a damaging thing. The stream was pretty well choked up with vegetation. Now it's clean gravel."

Weed beds in some cases served to choke out the food-producing, unsilted riffle areas and also sheltered too many small fish from predation and natural attrition. These factors, in turn, helped contribute to overcrowding, particularly among brown trout, the dominant fish in the stream.

"The fish populations were too high for what the stream could haldle," Workman says. Stream studies in 1971 and 1972 showed that big fish over 18 inches long weren't abundant, and that even small fish weren't up to par as far as weight.

The weed beds helped to contribute to the poor fish condition too. In addition to sheltering small fish and increasing their survival rates, Workman suspects that the dense cover also made insect life difficult for the fish to get.

"A lot of people were confused as to why the fish weren't in as good a shape as they should have been," he explains. "I just feel that because of dense weed growth, the food wasn't as available to the fish as some people thought."

Another positive aspect of the flood is the scouring of the stream bottom, which washed away silt and exposed gravel beds that are beneficial for insect reproduction.

Armstrong has already begun to restore itself. Weed growth is evident on the stream bottom and insect life is apparent, although not abundant. While fish counts have not been made yet, Workman feels that even if some fish migrated out of the stream during the flooding, it will be a boon for the overcrowded population.

To many people, what was more surprising and upsetting than the flood was the installation of a pump for Allyn O'Hair's fish ponds, which are located near the lower end of the stream. Some ponds were built in 1973 and filled by pumping water out of the lowermost pool. More ponds were constructed in 1974 and, to fill them, excavation was done near the parking area, vegetation destroyed, a pump installed, and a small canal dug along the west bank of the stream. Allyn O'Hair didn't inform Trout Unlimited of the project. He didn't have to, for the lease stipulated nothing to restrict his use of the stream water or surrounding land. But some TU representatives in the area were upset. One TU member described the project as adding up to "considerable visual impairment," and even Allyn O'Hair admits "it looks like hell."

While some TU members are upset with the looks of the water diversion structure that Mr. O'Hair put in, they hasten to add that the damage is strictly a visual thing. Fred Terwilliger, a member of the Spring Creek Committee of the Joe Brooks Chapter, says: "I think the project in the long run won't affect the stream or the fishing except indirectly through people's attitudes." Furthermore, O'Hair says he plans to revegetate the bank where the bulldozing and riprapping were done.

Allyn O'Hair says, "For years I've told farmers and ranchers that rather than fight hunters and fishermen, we've got to get along with them. I've always felt that if we're not good to the public, they'll all be against us eventually."

Fred Terwilliger says, "We've got to try to convince these ranchers that we're on their side, and that they'll be hurting if we don't preserve streams before the industrialists get here."

Allyn O'Hair is particularly incensed by proposed legislation regarding wild rivers. He lost about 100 feet of land along one-half mile of the Yellowstone this spring and fears that he may eventually lose Armstrong Spring Creek if the river continues eroding toward his property. The solution, as he sees it, is a stream-bank riprap to prevent further erosion.

"The concept of a wild rivers act is opposed to any form of stream bank preservation," he says. "The definition of a free-flowing river is just exactly that — it's free of any obstruction by man . . . But when you lose land, you lose it forever. It all goes downstream; nobody ever heard about washing upstream . . . I think we've got to conserve our land, not only for wildlife and fishing but for food and humanity," Mr. O'Hair stated. He feels that stabilizing the river bank to protect his land and livelihood is necessary.

When O'Hair says it's necessary, he's not just being truculent; he's speaking from conviction that reaches back many years.

"These are things you have to do. You don't like them, and everybody faces them in some way or another, but you do them."

The Field 2 March 1985.

Colour through the eyes of trout

The Field 2 March '85

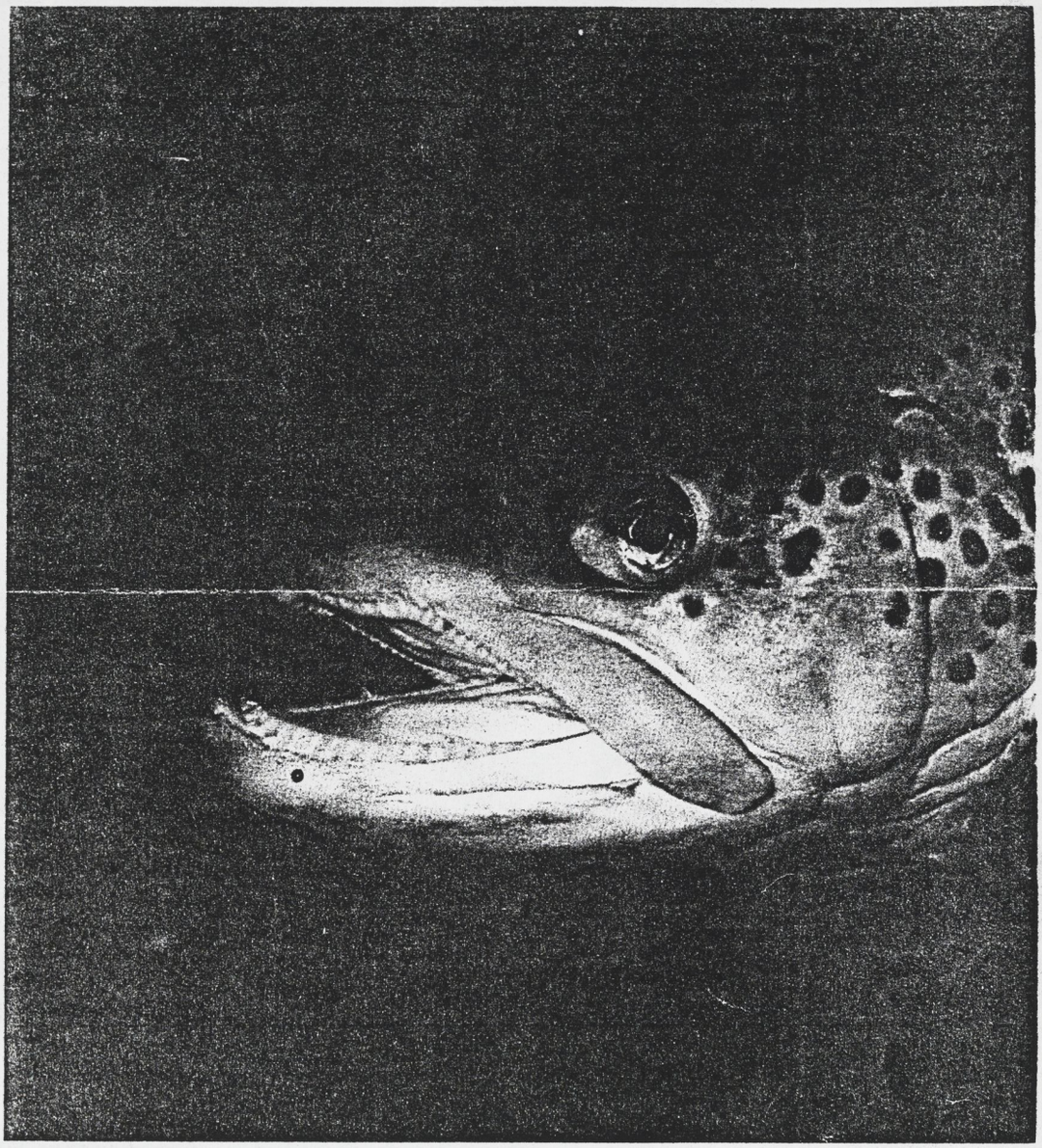
AS A RESULT of recent research it is now possible to say a great deal about how life looks seen through the eyes of a trout. Over the past two or three years neurophysiologists have invented microelectrodes so small they can record the firing of individual nerve cells deep within the brain of an animal. By 'listening-in' to messages as they travel along nerve fibres it is quite easy to discover precisely what the trout's eye tells the trout's brain.

By feeding the information into a computer wired up in a similar way to the trout's brain it is possible to reconstruct the picture you would see if you were inside the trout looking out at the underwater world through its eyes. 'A man must study a beetle from the outside,' wrote Chesterton, 'because it is quite difficult to get inside a beetle.' Stepping inside a beetle or any other animal, however, no longer presents the problems it did.

Man's ability to see colour is due to the presence in the retina of the eye of cells known as cones, of which three types exist: one type is sensitive to short wavelength (blue) light, one to medium wavelength (green) light, and one to long wavelength (red) light. Light arriving at the eye stimulates one or more of these types of cones in varying amounts depending on its wavelength, and the brain translates this information on wavelength into the subjective mental code we call colour. ('Redness' is only a conventional code, an arbitrary sign, like a letter of the alphabet, ascribed to light of a particular wavelength. The real world is totally devoid of colour.)

This system of colour vision is termed 'trichromatic'. Using this trichromatic system human colour vision is limited to a relatively narrow spectrum of wavelengths between 400 nanometers in the violet and 740nm in the red (for us, the visible spectrum runs from violet through blue, green, yellow and orange to red).

Recent research using advanced new techniques of microspectrophotometry has shown that the mechanism of colour vision in the trout is different. The trout is 'tetrachromatic'. That is, the trout's ability to see colour is due to the presence in the retina of four types of cones, one sensitive to very short wavelength light at 360nm, one to short wavelength light at 455nm, one to medium wavelength light at 540nm, and one to long wavelength light at 630nm.



Brown trout. The trout's tetrachromatic vision means that it can see colours invisible to man.

What do these results mean? Put simply, they show that trout have much better colour vision than we do in two ways. First, within the spectrum of colours visible to man, i.e, violet through red, trout can distinguish more shades than we do. Experiments have shown that a man with good eyesight can distinguish some 250 pure shades of colour and some 17,000 mixed colours (pure colours form part of the spectrum violet to red, mixed colours are a mixture of different colours of the spectrum, e.g., purple is a mixture of violet and red).

Similar experiments have shown that within the same band of wavelengths trout can distinguish some 350 pure shades and some 25,000 mixed shades, which is roughly what one would expect given the wavelength sensitivities of the four types of cone, the density of cones in the trout's retina, and the organisation of the visual computer in its brain.

Human colour vision is good at the red end of the spectrum, slightly less good towards the blue-green end of the spectrum (we can see about 130 shades in the yellow-orange-red half of the spectrum, about 120 shades in the green-blue-violet half). The trout sees more or less the same shades of yellow, orange and red as we do (i.e., around 130), but it can see more than 200 shades of green, blue and violet.

Secondly, the results mean that trout see colours invisible to man. With his trichromatic system man sees a limited spectrum of wavelengths. With its tetrachromatic system the trout sees a spectrum of wavelengths from 290nm in the ultraviolet through far violets at about 350nm to reds at about 750nm. This means, that a rainbow looks different seen through the eyes of a man and seen through the eyes of a trout. Our rainbow has six colours. The trout's rainbow has eight colours (ultraviolet, far violet, violet, blue, green, yellow, orange and red).

A field of poppies, too, looks different seen through the eyes of a man and

The Field

Carmelite House
Carmelite Street
London EC4Y 0JA

Write for reference to
the award.