

The Science of Trout Fishing

By WILLIAM W. MICHAEL

IN writing an article on the science and the sport of trout fishing one hesitates between adhering strictly to the technical aspects and leaning toward the popular. It is difficult to know at just what point to begin—whether to assume that the reader has, so to speak, passed through elementary school, high school, and college and is ready to enter upon a graduate course, or to begin at the very beginning. It is the opinion of the writer that the latter approach may be in order, at least to cover the fundamentals for those who are beginners. The experts may, as they please, omit the portions with which they are already familiar.

In this discussion the writer hopes to bring out six main topics, namely: mechanics, entomology, hydraulics, optics, chemistry, and meteorology; and to show their application to fly fishing, with the emphasis on the float- ing or dry fly. This, in the mind of the reader, will bring up the question, why fly fishing? It should be understood that the writer has no quarrel with the bait fisherman, he himself having passed through this stage some 40 years ago as a boy. In fact, he learned much about the habits of trout in those days of bait fishing. It is his opinion, however, that fly fishing has possibilities in the way of true sport that the use of bait does not offer.

FLIES VS. BAIT

In these days of heavily fished streams, which are likely to be the only ones readily accessible, some means of assuring the continuance of the sport must be found. It would seem fair to limit certain streams to fly fishing as well as to limit others to bait fishing for those who for whatever reason cannot change their methods. Some of the Eastern states have done this with excellent results. In the Kennebec Stream in Maine, where fish up to three or four pounds are not uncommon, a fisherman is allowed to kill only one trout a day; all others must be returned to the stream unharmed. Naturally this restriction precludes the use of bait. One can enjoy excellent fishing on this water, and in using a fly he can release the fish without doing them any permanent injury. The Deerfield River in western Massachusetts has, or did have only a few years ago, a limit of three trout killed, none under 16 inches in length to be kept. That portion of the stream restricted to these conditions naturally necessitated the exclusive use of a fly. Pennsylvania has set aside one stream where only women and children are permitted to fish. It is the writer's understanding that this stream is not necessarily restricted to fly fishing, but carries a limitation of the number of times per season that any one person may fish it.

The legal limit of 25 fish in California could easily be reduced to 10 or 15 at the most. Montana and Idaho have prohibited the use of salmon eggs, not that a single salmon egg is so deadly, but when this bait is used, literally by the case, for chumming, as is done on some of the High Sierra lakes of California, the sport of trout fishing loses its appeal.

To those of us who have been converted to the use of flies, the all-absorbing fascination of the sport, the skill developed, and the fact that there is always something new to be learned, regardless of the years we have spent learning the art, have their distinct appeals, and we know that no other form of fishing can quite equal this. If we find that a trout will not rise to a Royal Coachman, we still have unlimited other patterns that

may lure him to the surface. We can cover more water in the same length of time by the use of the fly than is possible with the use of bait.

The writer often has asked some of his friends who are content with using bait, "Why not try a fly?" The answer has invariably been that they catch enough fish with bait; so why try flies? This is an admission that they are more or less satisfied individuals who do not appreciate the fact that in any form of sport there is always an opportunity to learn something new. It is not difficult to learn to cast a fly. An hour or less with a good fly fisherman, and anyone can master the fundamentals. After that it is purely a matter of practice to develop sufficient skill to handle the equipment.

A false opinion exists in the minds of many that the fly fisherman considers himself a superior individual. Such is not the case. We merely entertain the opinion that we are enjoying our sport to the utmost. Often too, the bait fisherman feels that the equipment necessary for fly fishing is too expensive. The writer started off with an outfit that cost not more than seven dollars. With this equipment he learned the fundamentals and fished for several years with considerable success. True, one may spend almost any amount of money, but this is not necessary to full enjoyment of the sport.

EQUIPMENT: THE ROD

In regard to the equipment, the following items are absolutely essential and fundamental: a rod, a reel, a line, a leader, and a fly. True, this is just a beginning. One acquires suitable clothing and accessories. The dry fly purist on approaching the stream is sometimes bedecked like a Christmas tree with all types of gadgets, many of which are useful but not always necessary. It might be mentioned that the fisherman should carry a landing net, dry fly oil, a stream thermometer, scissors, amadou (an absorbent material for drying his fly), various fly and leader boxes, sun glasses, and, of course, a rain coat and hat in regions where rain is a possibility.

Of all the equipment, the rod is the most important. The truly good rod is the most difficult thing for the amateur to select. Too often the salesman is not an experienced fisherman, although his intentions may be of the best, with the result that the novice finds after several trips to his favorite trout stream that the rod does not function properly. No material has yet been found that will equal bamboo. Lance wood and green heart have been tried, but although they have their place, they cannot equal the bamboo. Steel also has been tried, but has never proved to be the equal. The best cane for rods was obtained before the war from the province of Tonkin in China. It was seasoned for several years before it was fit for use. The best cane came from hillside regions that were subjected to strong winds, which developed the resilience in the fibers so necessary for casting. When one considers that in using a dry fly he may make from five hundred to a thousand casts in a day's fishing, it can readily be understood that very few woods have the property of standing up under such a terrific strain. Nor does this take into account the strain on a four-ounce rod in landing a large trout in swift water. The bamboo is split into sections of equilateral triangular shape so that six of these may be glued together to form one section of a hexagonal cross-section. These individual sections are tapered to fit the require-

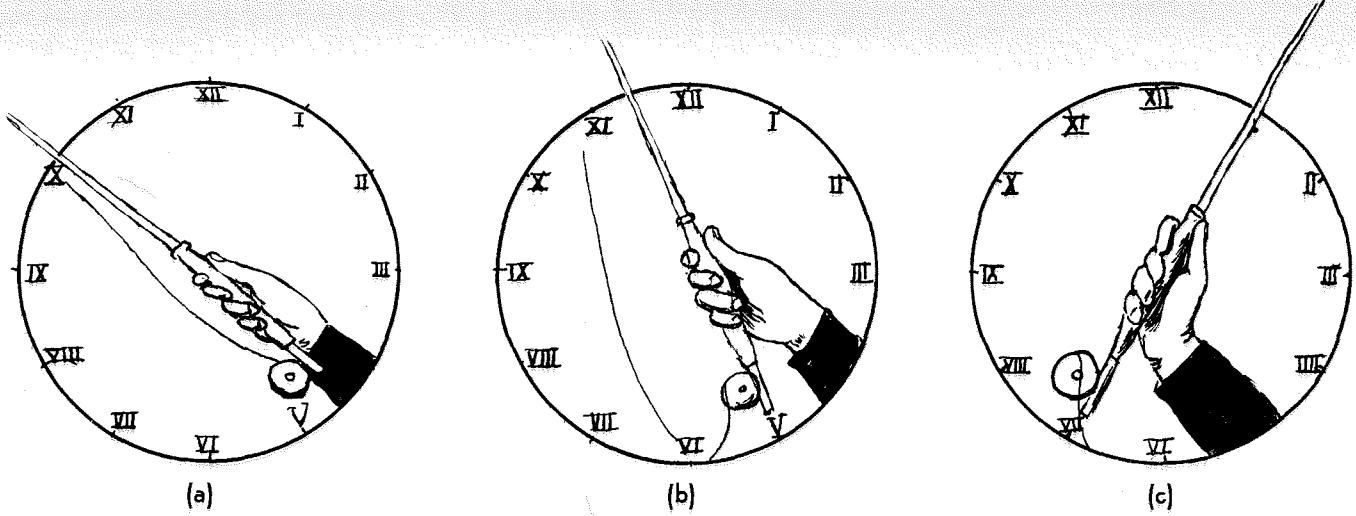


FIG. 1: Casting.

ments of the finished rod so that the completed product may have a uniform taper from the butt to the tip. The taper is accomplished on only two sides of the individual pieces, so that the natural enamel of the bamboo is not disturbed.

For dry-fly fishing it is recommended that a rod not to exceed four ounces in weight be selected. Certainly the lower limit for practical purposes should not be under two ounces, and even this light weight in the hands of anyone but an expert would not be desirable.

In recent years the two-piece rod has met with favor as against the older three-piece. One experiences enough difficulty with ferrules so that the elimination of one set is a distinct advantage, to say nothing of increasing the action of the rod. It is imaginable that a one-piece affair might be the most desirable, but transportation of a slender eight-foot delicate bamboo wand would present an extremely difficult problem.

Before the war an excellent rod could be bought for 15 dollars, or, if one so desired, he could spend up to 60 dollars. It is the writer's opinion that if he were blind-folded and a half dozen rods, made by the same rod-maker, and ranging in price between these two limits, were placed on a table before him, he would be unable,

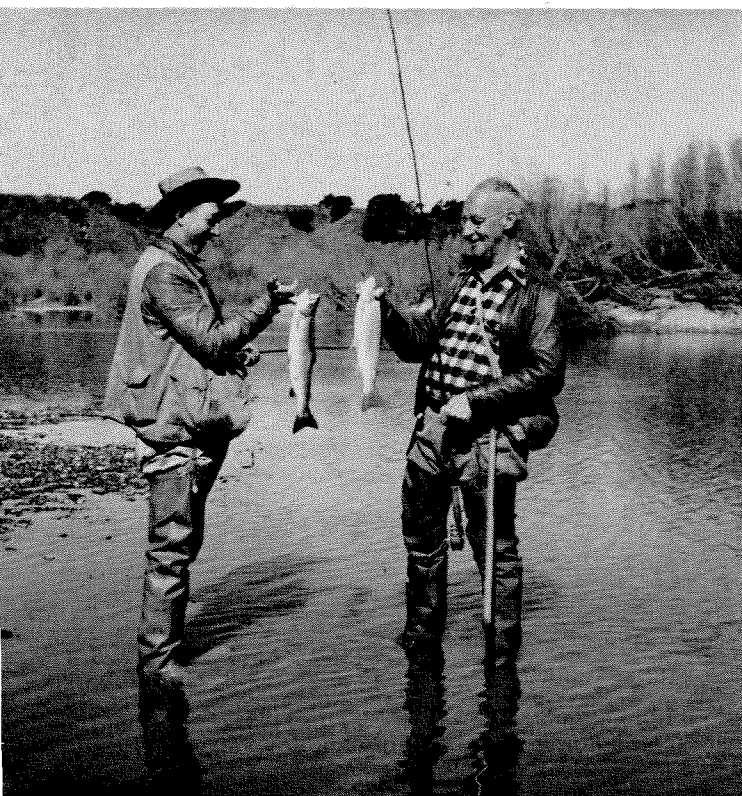
by the feel of them, to determine which was the most expensive. The only difference is that if a person fishes over a period of years, in the long run the more expensive rod will be the best investment. The materials of the expensive rod are much more highly selected, the fittings are better, and it will stand up under the punishment of a lifetime.

It is most difficult to describe that intangible something about a high-class rod that one instinctively knows is there when he starts using it. This is the quality that comes only by experience. One thing to avoid is too whippy or limber a rod. The initiated like to use the term "backbone," which is a most desirable feature.

REEL, LINE, AND LEADER

The reel which is preferred by most dry-fly fishermen is of the single-action type. The automatic reel, particularly among the Eastern fishermen, is not indicated for dry-fly work. The reel should weigh at least as much as the rod; preferably approximately one and a half times as much. It should have a permanent click so that it cannot be thrown off accidentally when most needed. Some authorities favor a left-hand reel so that the right-handed person may always maintain a firm grip on the rod and do the necessary work with the reel with the left hand. If one is fortunate enough to be playing a large fish, and has to transfer the rod from the right to the left hand, it may be at that exact minute that the trout will make up his mind to go places and the fisherman will find that he has no business transferring the rod from one hand to the other. For this reason, the left-hand reel is sometimes preferred. An agate line guide is a desirable feature; it is well worth the slight additional cost.

A tapered line is practically essential. A line of the soft finished or vacuum-processed type, 30 yards in length, is standard. Without going into details as to diameter, size, length of taper, and finishing processes, it may be said that the one essential is to have the line fit the rod. Too heavy a line will "kill" the action of any fly rod. Too light a line will not develop sufficient action for ease in casting. The tendency is usually toward too light a line for a particular rod. A favorable comparison would be that of attaching a string to a broomstick and trying to develop a springlike action in the stick. Many of the rodmakers attach to the rod a tag upon which is printed the size of line best suited to this particular rod. However, there is nothing like a trial to convince one of the best weight of line.



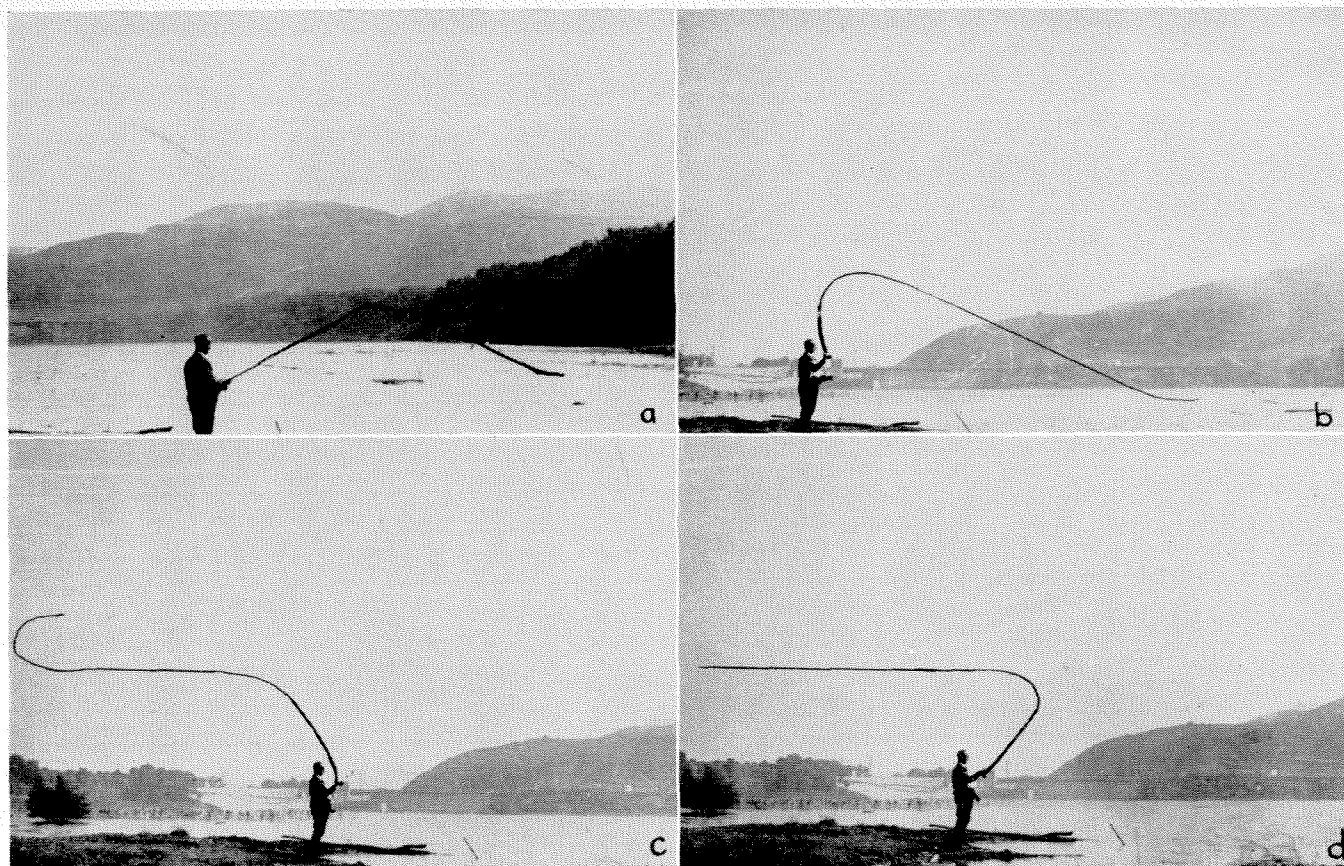


FIG. 2: Positions of line in fly-casting.

The next item to receive consideration is the leader, which is the connecting link between the end of the line and the fly. The materials from which leaders are made are of two types: one nylon and the other silkworm gut. Actually the silkworm material is nothing more or less than the unspun silk of the silkworm. The contents of the sack containing the unspun silk are stretched by hand and allowed to dry. As finer sizes than this method produces are needed they are drawn through dies until the correct size is obtained. The size of this drawn gut is indicated by numbers 1X, 2X, 3X, 4X, the larger size having the smaller number, the smaller size the larger number. The nylon is a comparatively recent development and has certain advantages over the natural, one being that it has a higher tensile strength for the same diameter. A leader is tapered from a large to a small diameter and may be anywhere from seven feet to 12 feet in length. In order to accomplish this taper it is necessary to tie strands of diminishing sizes together, each strand being approximately 16 to 24 inches in length.

A leader tapered to 4X in nylon will have a breaking tensile strength of one and a quarter pounds. In low clear water it is necessary that we use the terminal end of the leader of the finest possible size so that the fish can have no perception of anything attached to the floating fly. It should be mentioned here that in dry-fly fishing the leader should in all cases be submerged and not permitted to float on the surface. The silkworm leader must always be soaked between moist pads before it is used on the stream. This preparation is not necessary with nylon, although, in the writer's opinion, it is a help to keep it moist up to the time it is used.

At present none of the equipment mentioned is obtainable, because of the restrictions on manufacture by the war. Occasionally one finds a few items in some obscure sportsmen's store. Anyone who owns a good fly rod at

this time should treasure it most highly. Even if the makers are again permitted to start their manufacture, it will undoubtedly be several years after the war before any rods are available, unless a stock of bamboo has been held over from pre-war days. Since most of our bamboo comes from China, the probabilities of an early shipment are very remote.

FLIES AND CASTING

It is with fear and trembling that the writer approaches the subject of flies. There are so many opinions as to size, color, and pattern that to mention any particular type as better than another would be arbitrary. One of the things that make fly fishing so intriguing is the fact that possibly the fly which would today fill a creel may not even raise a trout tomorrow. For a beginner one of the easiest dry flies to use is what is known as a bivisible. It has the ability to float well and is readily visible to the fisherman. More on flies will be covered after we have taken up the topic of entomology.

The mechanics of fly casting are relatively simple. A rod acts as a lever to pick up the line from the water. With the advantage of its resilience it throws the line into the air behind the fisherman so that he is really casting the line and the fly rides along with it. The simplest manner of showing the fundamentals of fly casting would be to refer to *Fig. 1*. Imagine the fisherman standing against a wall where there are three clocks behind him. He starts with the line on the water and the rod held as in (a) at 10 o'clock. The line is picked up and thrown into the air as shown at (b) with the rod in the position between 11 and 12 o'clock. The rod is carried through to approximately 1 o'clock as at (c). A definite pause is made here so that the line will straighten out behind the fly caster. Just as soon as this is accomplished, power is applied for the forward cast,

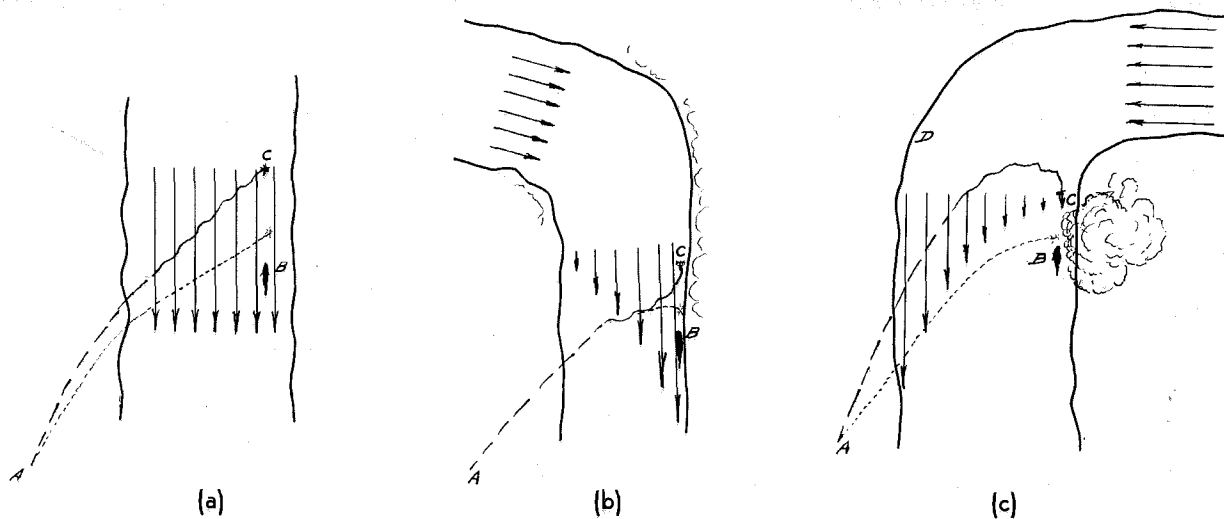


FIG. 3: Drag. Length of arrows indicates relative velocities. Solid lines indicate only that portion of leader and line in contact with the water.

the rod then being carried through to the 10 o'clock position, where the motion is checked. The line follows along and straightens out in front of the caster. Checking the rod at the 10 o'clock position permits the fly to drop lightly on the water. If a distinct pause is not made at the 1 o'clock position, and the forward cast is started too soon, it is like cracking a whip and the fly is popped off. This is one of the common faults of the beginner. Should he pause too long, then the line drops to the ground behind the caster, the fly undoubtedly gets caught on the brush, and there are the same results as though he had started too soon. In the retouched photographs, *Fig. 2 (a)* shows the position as the line is being taken from the water. In *(b)* the rod is curved, acting as a spring. In *(c)* the back cast has been checked and the line is straightening out to the rear of the caster. At *(d)* the caster is starting the forward cast, which will be carried through to the position shown in *(a)*.

One suggestion may be of help to the beginner. In aiming a fly at a particular spot on the water, it is better to aim at a point two or three feet above, as this will permit the fly to float down of its own weight and alight with much more delicacy than can be obtained by aiming at the exact point on the water. The line should be taken up off the water quite vigorously in starting a cast, and if the caster will aim for an imaginary point directly over his head, this will be of considerable assistance.

After a few trials one becomes conscious of a certain rhythm to the whole procedure. The finished fly caster is never conscious of how long to pause for the line to straighten out, and rarely gives thought to catching anything on the back cast in the way of a tree or brush. He seems to know instinctively just what is happening behind him, whether he sees it or not.

ENTOMOLOGY

The entomology of the subject is fascinating. One who has never had the cycle of life of the common stream insect brought to his attention has missed one of the most interesting things in trout fishing. Briefly, it is about as follows: In its initial state an insect is a larva. Grubs and caterpillars, for instances, are larvae. From the larva stage the insect passes into the pupa, and last to the imago or fully developed insect. A pupa may be likened to the caterpillar and the imago to the butterfly. In so far as it affects the trout fisherman, the metamor-

phosis is as follows: The female fly deposits its egg on or in the water of the stream; in turn the egg sinks to the bottom, and hatches into the larva, which in the pupa stage, may or may not incase itself in a covering attached to a stone, log, or twig on the stream bottom. In the course of time, anywhere from one to three years, certain physical changes are taking place, until finally the insect is ready to dispense with its covering and rises to the surface and takes to the air. The imitation of this rising nymph from the stream bottom is the common artificial wet fly.

After the natural nymph reaches the surface its wings unfold and it flies away, a fully developed insect. Before flying from the water it often rides along on the surface while the wings are drying and developing. It is at this stage that the trout fisherman imitates the natural with his floating dry fly. This word "imitates" sounds exceedingly simple, but so many things actually come into account that effective imitation is the most difficult thing the dry fly fisherman has to contend with. Many factors are involved, such as stream currents and drag, which will be taken up a little later.

It is the hope and dream of every true follower of Izaak Walton to be on the stream when a hatch is in progress. Most often these hatches come in the evening. The writer has stood beside the pool of one of his favorite streams in the Catskills of New York of an evening and has seen literally hundreds of insects emerging from the surface of the water. So many have been in the air at a time that it was possible to catch some of them in one's hand; one could examine the sample and frantically search through a fly box in hopes of finding a correct imitation of a natural. This hatch of flies, as they come off the surface of the water, is one of nature's most interesting phenomena.

HYDRAULICS

To return to first principles, fly fishing consists of two distinct schools: the wet fly and the dry fly. Much heated argument has arisen between these two schools as to the most effective way to catch fish. In all fairness it must be said that both methods have their merits, depending on water and air conditions. The writer favors the dry fly, yet on occasion it does become necessary to use the wet when the water is high or slightly discolored. It is the fascination of the dry fly method that is undeniable. This calls for the closest coordination

between the hand and the eye; it develops to the greatest extent one's reflexes and reaction time. And now our discussion of dry fly fishing leads directly to the subject of hydraulics.

We must fish up stream and endeavor to the utmost to have the floating fly follow the current as though there were no connection between the fly and the fisherman. This sounds extremely simple, but as a matter of fact it is the most difficult operation that we have to learn. Unless the fly floats with the current the chances are that the trout will refuse it. If there is any cross pull or any motion imparted to the fly except that caused by the natural currents, no results may be obtained. When a line and leader fall across swift water and drop the fly on to a more quiet portion of the stream, the tendency is for the line to travel faster than the fly, so that the fly is dragged somewhat across current.

Reference to *Fig. 3* will indicate three typical cases. *A* in every case represents the position of the fisherman, *B* that of the trout, and *C* where the fly will drop. The arrows represent relative velocities of the surface current. It is always wise to drop the fly some three or four feet above the feeding fish so that it may float down with the current over the spot where he is most likely to rise. *Fig. 3 (a)* represents the straightaway stream with a uniform current. It presents no great difficulties, as the fly will be dropped at *C*, and the leader and the position of the line on the water will move at a uniform rate. In *(b)* we have a much more complex problem. There is a sharp bend in the stream and naturally the current will be swifter on the side where the fish is located. Here if the line and leader are placed as in *(a)*, by the time the fly is expected to reach the fish it will be pulled out into the current and pass considerably to the left of him. The same condition will hold in *(c)*, even though the bend of the stream is reversed. To overcome this difficulty the expert has developed what he calls a loop cast. In *(b)* there has been thrown a downstream loop with some slack line and leader. The current against the bank is much swifter than in the center of the stream; therefore, the fly will travel faster. The loop then permits enough leeway so that the fly will float directly down over the fish without any side pull while the loop is

straightening out. In *(c)* the situation is reversed, and the fisherman throws an upstream loop so that by the time the fly reaches the fish the line and leader will have straightened out, as is indicated by the small dotted line. In this connection it might be said that in the diagram *(c)* the most probable place for a trout would be at *D*. However, at times one finds a good fish in the quieter water, particularly if there is an overhanging bush or cover such as is indicated in the drawing. In fishing the water at *D* it would be much better if one were to move over to the other side of the stream and fish from the opposite bank. Were he to cast from *A*, as shown in the drawing, for trout at *D*, he would "line" the fish. This simply means that there would be no way of placing the fly over the fish without either the line or the leader first passing over the trout. Such an effect almost invariably scares the fish or "puts him down."

The loop is not too difficult to execute. In throwing an upstream loop one carries through the cast as usual, but holds the rod in a horizontal position. At the end of the cast he gives it a slight jerk back against the direction of motion. This throws the loop, the convex side of which is upstream, as in *(b)*.

Everything else being equal, the more the surface of the water is agitated, the nearer one can usually approach the trout. Pockets behind boulders and slack water along the edges of the stream often hold a good fish, and if one can drop a fly on one of these places the response is sometimes immediate and satisfying.

OPTICS

In order to get the trout's point of view one must mentally project himself into the trout's environment under water. This introduces a study of optics. A trout usually points upstream into the current, and for that reason the dry-fly fisherman approaching from downstream has the distinct advantage. What the fish sees of our world is limited to what is commonly known as his window. It is as though the under side of the surface of the water were a mirror with all of the stones and underwater objects on the stream bottom reflected against it, except directly overhead, where there is a circular area through which the trout looks into our world. Reference

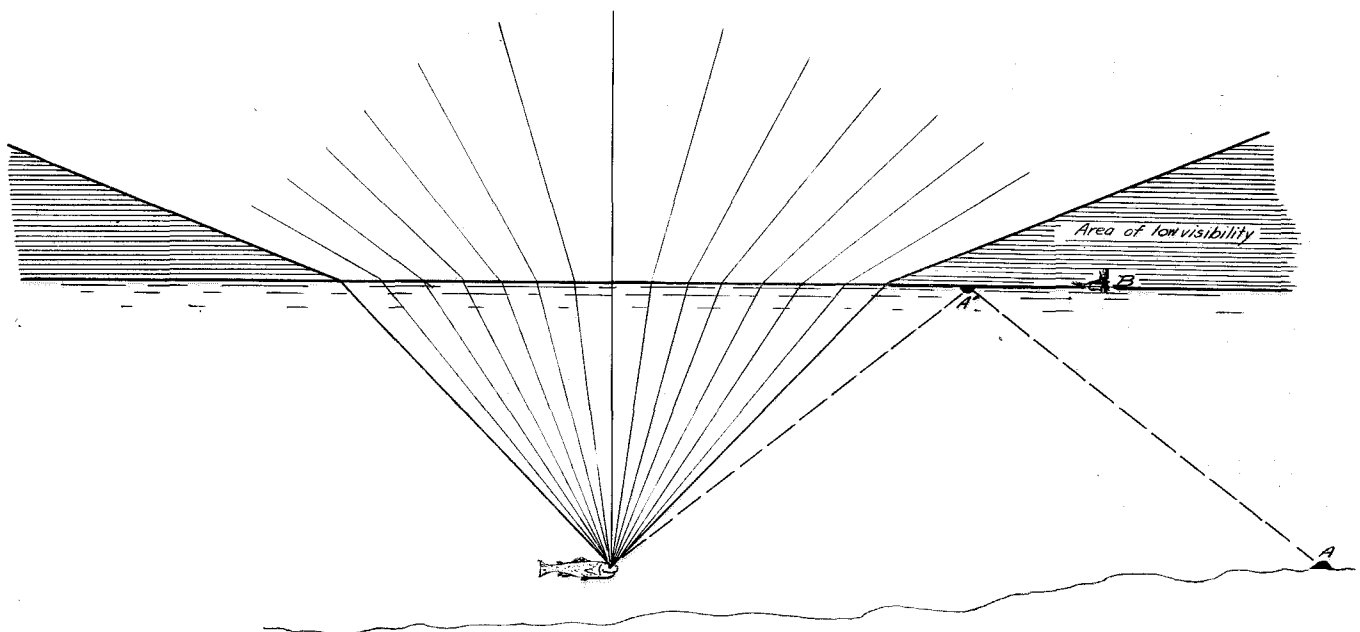


FIG. 4: The trout's window.



FIG. 5: The fisherman as he looks to the fish. (Courtesy of American Museum of Natural History, New York.)

is made to Fig. 4. Vision is restricted to the fish from reflected rays from objects outside of the water. A ray of light coming from directly overhead will go directly to the fish. Any ray coming from any other point except directly overhead will be refracted, the angle to the horizontal becoming flatter as the edge of the window is approached. Remember that this window is circular and can be compared to a funnel with the small end at the fish's eye. Finally we reach a point, shown by the very heavy line, where only a small portion of the rays will penetrate the water, most of them will be reflected up, so that anything in the shaded area will be less visible to the fish than in the non-shaded area.

Objects on the bottom, such as the stone at *A*, will be reflected at *A'*, and be seen by the fish. It must be remembered that wherever the fish moves, the window moves with it; also, that the closer to the surface he is, the smaller will be his window and consequently, the less he sees of our world. This accounts for a question which at one time puzzled the writer—why it is possible for him to approach so much nearer in shallow water than in deep water before he is seen by the trout. At *B* is an artificial fly floating on the surface. Imagine the current flowing from right to left and the fish heading into the current. This particular trout will be conscious of something coming towards him, possibly food. He is conscious of this because the water surface has been broken and

he sees a distinct sparkle. Just as soon as the fly enters his window he will be able to see whether or not it may be palatable. If he believes it is, then he will rise for a closer view. If it is an artificial fly, and we have done our part correctly, he will undoubtedly take, much to our satisfaction, and to his disappointment. If the fly is not moving with the current as though it were detached from our equipment, but is dragging across current, it is safe to say that he will refuse it.

Inasmuch as the rays of light reaching the fish are bent or refracted, objects outside of the water have a decidedly distorted look to the trout. It is interesting to know that Mr. Eugene Connett III in his book *Random Casts* states that a man standing six feet above the water 15 feet away from the trout appears to the trout to be 15 inches high; at 30 feet, nine and a half inches. His apparent breadth is not greatly affected, so that he must appear as though he had been telescoped. Fig. 5 is a reproduction from the American Museum of Natural History showing how the fisherman looks to the trout. That portion of him below the surface of the water looks quite natural to us, but what the fish sees through the window is considerably flattened.

The often repeated warning not to let your shadow fall on the water is excellent advice. However, the fish does not have an eyelid and cannot close its eye as a human being does; consequently, when the sun is shining on the eye which is on the side of the sun it is more or less blinded. This gives the fisherman the distinct advantage, if he approaches the fish between the sun and the fish rather than on the shaded side. By casting the fly on the far or shaded side, he causes the trout to see it with his eye away from the sun.

Another point to remember is to keep as low as possible, trying to blend in with the foliage, if there is any. Also, one's clothing should be of a subdued color. Avoid wearing anything white, remembering that reflected light from a white object will carry to the trout almost as readily as though a mirror were reflecting the light. Often with the sun in one's face when facing upstream the light is reflected directly back into the water, while with the sun on either side it will be reflected away to the far bank. And don't forget that a rod held high is more visible than one held low with the cast being made from the side.

One word as to the fish's conception of color. It has recently been shown with an evident degree of validity that he does have a conception of color. This was accomplished by experimenting with color in certain foods; the fish always selected the color which was the most palatable.

It is questionable whether or not the sight of a fish is as important as his reactions to vibration. There is a so-called lateral line running along the fish's side, marking a highly sensitized nerve. It is this lateral line that warns him of approaching enemies by the vibrations set up in the water. For this reason, extreme care should be taken when wading and walking along the banks, particularly if they are undercut, as we find them in some of the meadow streams. Roule, in his book, *Fishes and Their Ways of Life*, says, "On the basis of the vibratory impressions, which the water transmits, the fish come or turn aside, avoid and flee, according to the reflects provoked." Authorities have stated that the ear of the trout is rudimentary; that is to say, as a means of hearing its chief function is to maintain a sense of equilibrium.

It is believed that a trout is always foraging for food unless disturbed by the instinct of self-preservation. Sustaining life by the search for food, and sustaining life by protection from enemies—these are the two main

instincts. Often when a fish is hungry his fear of harm will be unbalanced by his desire to eat. It is at this time that the fisherman really meets with success.

CHEMISTRY

Chemistry enters into our fishing to a slight extent. Mention has already been made of the DuPont nylon in replacing the silkworm.

We know that a range of temperature from 50 to 65 degrees Fahrenheit is the most ideal range for dry fly fishing. When the water reaches 74 degrees, it is almost impossible to interest a fish in any artificial fly. The oxygen content of water is proportional to its temperature. As the temperature rises the oxygen content diminishes and the activity on the part of the fish also diminishes. It is for this reason that the expert will carry a stream thermometer to determine whether or not the maximum temperature has been exceeded. If at all possible, he will seek those places where spring runs enter the stream or where the more aerated water is. The writer has noted one exception to this rule, the Fire Hole River in Yellowstone, which has furnished some excellent dry-fly fishing where the water temperature was above the 74 degree mark. Apparently the fish in this stream must have adjusted themselves to higher temperatures.

The growth of trout is dependent upon the oxygen content, the temperature of the water, and the food supply. On Hot Creek in the High Sierras, the fish culturists have noted a growth of one inch per month, up to a total of approximately six to seven inches. The temperature here is virtually uniform the year around, and the food supply is more than abundant. Hot Creek is practically ideal—the laboratory type of stream for trout growth.

METEOROLOGY

The subject of meteorology has definitely some bearing on trout fishing. It is known that the barometric pressure influences the results to a marked extent. On a falling barometer the fisherman may as well stay at home, as far as any fly fishing is concerned. Once the barometer reaches its lowest point, it may linger there until the storm center has passed and his chances may slightly improve. Once, however, the barometer starts up or is in a high position; the prospects are excellent. We do not know why an approaching storm affects the fishing, but the writer has seen this condition hold in almost every instance.

A few years ago on the upper Owens River he was fishing with a friend during a storm in October. The net result was two small trout—one apiece. That night the weather cleared, and the next day, a beautiful sunlit day, a second trial was made. The fishing took place over the same stretch of water, with the result that each fisherman took a limit in one morning. The day before, one would have reached the conclusion that there were no trout in the river.

The same experience was met with on one of the Montana streams last July. A fisherman's barometer was carried on the trip and a careful record kept of the pressure changes. In two weeks' time two different storms developed, each of a day's duration. As the barometer fell the fishing was not worth the effort, but immediately on its starting to rise, and after it had come up to a normal position, one had no trouble in taking all the fish he desired.

AT RIGHT:

FIG. 6: The author hooks a good one.

THE THREE ESSENTIALS

In the writer's opinion there are three main things in dry-fly fishing which contribute to success. One is the pattern of the fly, another the size, and the last, the way the fly is presented. Of the three, the presentation is the most important, having a weight of possibly 65 per cent, while the size may be weighted at 20 per cent, and the pattern at 15 per cent. This will sound like heresy to the wet fly fisherman, but it must be remembered that the dry fly is under discussion.

The writer has deliberately changed from one pattern to another, when the fish were rising, with equal success, as long as he did not select some outlandish creation. The size certainly has a distinct bearing on the way the fish respond, although when there is a large hatch of small flies it is often impossible to interest a trout in the exact artificial reproduction. This may be because a slight drag takes place and is readily detected by the fish. Why should he be interested in an artificial fly when there are hundreds of natural insects that he may take? It is never entirely possible to imitate a natural exactly, no matter how carefully the fly may be fashioned. The hook is always there, and will definitely show below the surface of the water. Sometimes when a pattern entirely different from the natural one on the water is used, the trout's curiosity seems to get the better of him. Maybe at that particular moment he wants a change of diet—anyway, it is sometimes worth trying.

Emphasis must be placed on the fact that the way the equipment is handled and the fly presented is the most important single point that the fisherman has to master. One of the best fishermen that the writer has ever had the pleasure of watching never used anything but one pattern.

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any form of world organization would be a futile gesture. There will be objection, of course, that to pledge the use of American armed forces in any enterprise not wholly within the discretion of our own government would be to surrender a portion of the national sovereignty. That, to my mind, is merely shadow-boxing with words. If by sovereignty we mean unlimited freedom of action, without any restraint, then no such thing has ever existed in this country, or anywhere else. All governments limit their freedom of action wherever and whenever it is in the national interest to do so. Every treaty that has been made since the establishment of the Republic is in effect a restraint upon the nation's freedom of action.

The danger is, of course, that when the time comes we will not flatly decline to contribute our share to an international force for the preservation of peace under the control of a world security council, but will conjure up such reservations to the use of this force as will make it slow in motion and relatively ineffective for its purpose. To insist, for example, that American armed forces shall never be used to preserve world peace save with the explicit authorization of Congress would be to render our participation subject to weeks and months of debate and delay. It would destroy the capacity for prompt action which is the prime essential of success in all military interventions.

Unhappily the American procedure for the approval of international agreements is such that it lends every encouragement to the strategy of senatorial mutilation. A treaty, whatever its provisions, goes into the Senate with the chances two to one against its emergence in any recognizable form. While it does not seem likely that the Senate of the United States, in the present temper of public opinion, would definitely reject the whole idea of using American armed forces at the behest of a world organization, there is no inconsiderable chance that it would proceed to burden the plan with emasculating reservations.

This danger is what has prompted the suggestion that instead of proceeding by treaty there should be presented to both Houses of Congress a joint resolution declaring the willingness of the United States to participate in an international force for the preservation of world peace and vesting in the executive branch of the government full discretion to authorize the use of American armed forces when the occasion arises. Such action would require only a majority vote in both Houses of Congress instead of a two-thirds vote in one of them. It would have ample precedent for its use since Congress on several notable occasions in the past has done things by joint resolution in preference to proceeding by treaty. The annexation of Texas just a hundred years ago was accomplished by a joint resolution of Congress; so was the annexation of Hawaii in 1898. The Constitution gives the Senate power over the ratification of treaties, it is true; but the Constitution is equally explicit in giving to Congress as a whole the power to take all steps that are necessary and proper for the national defense. So Congress can, if it so chooses, declare the adherence of the United States to a world security organization by means of a joint resolution and there would be definite political advantages in such procedure.

Back in the eighteenth century the 13 newly-independent American colonies became the leaders of civilized mankind by pointing the way to the solution of a great problem which the rest of the world had all but given up. They proved that a group of sovereign states could set up a new government and endow it with powers while yet retaining their own integrity. They demon-

strated to the rest of the world that national strength could be successfully combined with local self-government, religious freedom with a stabilized social order, and free enterprise with civil liberty. May we not hope that America, as we approach the middle of the twentieth century, may once more direct humanity along the paths to international order, justice and peace.

Trout Fishing

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This man was so good that it was an education in itself to have the privilege of just walking along with him and watching him work. True, he fished but one stream and knew it by heart, but nevertheless, he always seemed to be able to catch the fish.

The author remembers not so much the weight of the contents of his creel after a day's fishing, but rather the riot of color of the wild flowers along a Sierra stream in July; the light pouring down through the October aspens like a stream of liquid gold; rhododendron in bloom in June along the Rondout in the Catskills; azaleas along the Oconalufay in North Carolina; wild blackberries in profusion on the Rogue in Oregon; the fragrance of the pines on a warm summer's day on the bank of the Naches in Washington; beavers at work in the early evening on the Gallatin in Montana; a moose startled by the intruder on the Grayling; a wildcat streaking across an open meadow, and pausing a moment at the edge of the timber for a farewell look, in the high country of New Mexico; the deer drinking from a pool along the crystal waters of the Neversink; a sleek mink scampering across a log on an unnamed stream in Colorado; a band of antelope near the Lost River in Idaho; the sunsets on the Owens River with the Sierras as a backdrop across the meadows; and his once coming face to face with a bear on the Red River of the Adirondacks. These, and countless other memories, are what he cherishes during the long winter months of the closed seasons. The solitude, the peace, the quiet, and the time for reflection are the things that bring the trout fisherman just a little closer to nature than one can get in almost any other sport.

NAVY HONORS ARTHUR H. YOUNG

THE United States Navy recently gave a signal honor to Arthur H. Young, industrial relations consultant of California Institute of Technology and former vice-president of the United States Steel Corp.

At a luncheon ceremony held at the Athenaeum, Mr. Young was presented with a certificate of award for meritorious civilian service to the Navy in connection with the Navy Manpower Survey Board, of which he was the civilian representative for the 11th District. The luncheon was given by the Industrial Relations Section of Caltech, of which Prof. Robert D. Gray is head. Rear Adm. Ralston S. Holmes, U. S. Navy (Ret) presided and the award was presented in behalf of the Secretary of the Navy, James V. Forrestal, by Rear Adm. I. C. Johnson, director of officer procurement for the 11th Naval District.

Mr. Young was praised for his unstinting work with his large experience of a lifetime as one of the nation's top industrial leaders. In addition to the certificate, signed by Secretary Forrestal, a lapel emblem was presented to Mr. Young.