Doing this became I discovered that ff groups love to argue about hooks. (If you don't this will be short.)

HOOKS

The core of any fly -- its most important component -- is the hook. We ought to design flies from the core outwards. In fact we usually ignore the hook, or mention it as an afterthought.

This does not mean that opinions on the subject are lacking. In fact, hooks stir violent passions. A hook is like art: we don't know much about it, but we know what we like.

The geometry of hooks is the same in all sizes, but I want to emphasize small hooks for two reasons:

+ I just like to catch big trout on little flies.
+ Small hooks are the most difficult to design. If you can make a good small hook, you ought to be able to make a good big one -- though there are plenty of bad big ones out there.

Hook history: Hooks are the **only items of our tackle that are worse now than they were 100 years ago.** Rods and leaders have improved greatly. Lines are more diverse and easier to use, though not better than oil-dressed silk. Hooks are worse, but beginning to improve. From about 1945 to 1980, they hit bottom. Almost all fly-hooks in this country were made by one big firm. Lacking competition, it paid little attention to design or quality. Over the last decade, competition has increased and quality has improved, but machine-made hooks are still not as good as the hand-made ones of the last century. When you put them side-by-side under a low-power magnifier, the differences are striking.

Odd thing is that the study of hooks has also declined. When I began to get ~~serious about hooks~~ into the subject in the 1970s, I found that the most of the work on them had been done a long time ago. There were books at the turn of the century with everything you'd need to know, but the knowledge dropped out of circulation.

Will look in sequence at the strength, size, and shape (as it effects leverage) of hooks. Will try to differentiate between fact and opinion.

Hook Strength

New leaders (microbraid) may make the hook's job much tougher.

Opinion: you should never lose a fish because your hook breaks or springs. If there is a **weak link** in your tackle, it should be your leader rather than your hook.

In practice, ~~this means that~~ a medium-sized trout-hook (say size 14) should withstand a pull of about 3 lbs. You probably don't want to do your own testing, but here a method if you do.

CHART 3

Testing Hooks

(Worst-case scenario) in fishing

Hook engaged by point only. (That's how most fail.)

Hook can fail when it

a) breaks or

b) springs about 45°.

2 ways!

I'd rather have it break because then I know it's failed.

Conclusion: Difficult to get a 3-lb.-test hook in size 14 unless you do everything right.

Strength factors are:

CHART 4

Hook Strength (Factors)

(In order of importance)

1. Diameter of wire

   Stiffness varies w/4th power of diameter. $1.1^4 = 1.46$.

   (Forged shanks don't help.)

2. Temper

   Avoid

   a) soft or

   b) springy temper. Can release and spring back.

3. Quality of steel

   Hand-made hooks have more variation in shape but may use stronger wire. (Have not tested new Japanese hooks.)

4. Shape

   (Next chart)

CHART 5

Hook Shapes

All OK if: (a) short points and (b)round top of bend.

But each has pros & cons. (discuss later)

Round: Perhaps easiest to manufacture

Square: Hardest to make. Has nice long shank. Saves weight.

Sproat: Strongest after penetration, & best leverage.

CHART 6

Hook after penetration

Discuss strength. Refer back to Chart 3.

Weakest point is top of bend.

Hook Size

More difficult to determine than you'd think. You can't believe what the box says.

Only one international standard: Redditch scale, which measures length of hook less its eye. (Ref my book.) Still used in some countries. French insist on accurate sizing. In America we're casual, and the Redditch scale has fallen out of use in U.S. since Mustad took over the market after WWII.

There is no such thing as a Mustad hook standard. They size trout hooks by at least 3 different scales and won't publish any of them. Won't even sday iff they size by length or gape. Trout hooks in this country appear to be sized mainly by gape, and different sizes are applied to different models.

Chaos since Japanese entered market.

Recommendation: measure the hook, in mm. Write size in mm on the box. Use hook same length as natural fly being imitated -- less tail. Cheat a little at both extremes: use hook longer than natural for very small flies and ~~longer~~ than natural for large ones. (Based on experience.)

CHART 7

Measuring Hooks

Natural mayfly (measure less tails)

Hook (measure w/calipers, incl. eye.)

(Based on experience, not theory. 7 mm trico = 7 mm hook.

Hooking Leverage

Definition: "Positional advantage; power to act effectively." (American Heritage Dictionary)

CHART 8

Hook Terminology

(p.88 book)

A hook's point is more likely to make contact with the fish's mouth if the gape is wide and unobstructed. That much is obvious -- right?

Problem: Once the initial contact has been made, a wide gape lessens chances of penetration. Must sound confusing, so take it step by step.

CHART 9

Hook Geometry (trigonometry)

"Parallelogram of forces"

(p.98 book)

+ Note that I've added an eye to the hook. Have kept it flat (ringed) for the time being.
+ Imagine a rectangle.
  - Short side = gape
  - Long side = effective length of ~~shaft~~ shank.
+ Penetration improves as pull gets more in line with point.

CHART 10

Leverage for 3 Hooks

(p. 99 book)

zero leverage

1:1

2:1

(Aim for shank about half again greater than gape)

DEMO here with model hooks.

CHART 11

Summary of Common extremes

Added factor is effect of down & up-turned eyes.

Bad: Extra-wide gape or extra-short shank

Same effect: gape greater than effective shank length.

Long point

Prominent barb

Up eye. Always bad in small hooks

Good:

Gape & shank in about 1:1½ ratio

About the best achievable w/ small hooks

Short point

Small barb or none

Neat little eye turned slightly down

NOTE: Down-eye can always give you more gape and better leverage if designed right.

THE REST OF THE STRUCTURE

Of course, you can make any small fly into a bad hooker if you tie the wrong things onto it. Some things to avoid:

CHART 12

Bad Design

Deer-hair body blocking gape

Stiff tail/extended body

Stiff hackle

March 31, 1987

Dear Datus:

Dianne has passed along to me your comments on my little story in Bill Hunter's catalog. I appreciate your approval, a lot, and do hope to find time to write some other things along the same line.

She also related to me your advice about the olives on the Letort. I've been lucky enough to get a tour from Jack Russell at Fly Fisherman and a friend of his, Mike Schell, a very talented professional fly tier. I caught my first Pennsylvania trout, about a ten-incher (a brown), on the Yellow Breeches, on a #20 caddis tied by Mike. I also got to see Fishing Creek when they invited me to go along up to Barry Beck's fly shop the other day. The streams look really interesting, and I can see there is a bigger crowd problem than I saw in Vermont, but I'm not sure it will be worse than some of the fishing I've had in Michigan. If it is I'm still prepared to make the best of it. I've read so much for so long about these places that I really want to give them a good try. The Susquehanna is a nice river to have handy too.

She also tells me that Stackpole is interested in having you write a hook book, which I think is a great idea. There is no one else who could address the concerns - historical and modern - the way you could, partly because there is no one else who could make such an apparently narrow and dull topic as interesting as it really should be. I can see the history section now, with some prehistory, some good analysis of the various hook numbering systems over the past couple hundred years, some early hook theory, so much to consider. Have you seen Dick Stewart's Hook Book? It's a nice little book but there's so much more to be said.

But I gather there are obstacles, too, so I write in part to tell you what I know, for whatever it's worth. Apparently you've heard some bad things about Stackpole. I have heard that there was a president a few years ago who was a real jerk, and I've often thought - and had other people tell me - that they produced ugly books. Other than that I don't know anything especially bad. I suspect they don't pay very well, but I've never heard they cheat people; they certainly paid Dianne promptly (and pretty well) during the two years she free-lanced as a copy editor for them. I imagine that at Stackpole, as at other publishing houses, pay is negotiable and depends upon how much they want the book.

In any case, here is my general assessment. The company has all new leadership in the past couple of years. I've met David Detweiler, who has been president a year or so, and I know Chet Fish, Vice President, slightly, from when we first met when he was at Scribner's. David and I talked about your book, and he is an admirer of your writing, as am I. I've seen a substantial improvement in the appearance of Stackpole books in the past couple of years - Dave Hughes' new book is a good example, but

they've done some new birdcarving books that are really pretty handsome too. I don't know anything firsthand about their pay or their contracts, but I don't suppose they'd be much different from Nick's. Maybe none of that is new to you, but I must say that what I've seen in the past couple years has convinced me that Stackpole is doing a lot better job in some ways than it used to. Keep in mind, though, that my sources of information are not firsthand except for Dianne, who is fairly new to the company even though she is smart and learns fast.

As you know, Bud Lilly and I wrote a book that Nick is publishing. We wrote a second book at the same time, a memoir called A Trout's Best Friend, that is great fun and tells about Bud's life in Montana fishing. We looked around for a publisher and after a couple tries were able to interest Pruett Publishing Company in Boulder, Colorado. They did John Gierach's books, good productions, and I've met Jim Pruett and heard lots of good things about his work. We're pleased, and we hope we'll work out a happy arrangement to have the book published, I hope next year. Why I tell you this, besides thinking you might be sort of interested, is to say that after I sent the book off to Jim Pruett, Dianne's boss at Stackpole, whose name is Judith Schnell, heard about the book and said she'd be interested in seeing it. The point is that if Jim didn't want it, I wouldn't hesitate in the least to give it to Stackpole, and I would have complete faith in their ability to do it justice. What with being so close (as are you, at the moment anyway), it's easy enough to keep watch on the production stages of a book anyway.

So that's what I can contribute to this situation. If your agent is adamant, this won't make any difference. But if his information is old, you might think it over. It might be worth a try just to see what he can work out with them, and I'd sure love to see you do the book.

I've been rereading Vince's book, to see what he has to say now that I'm here and can maybe use the information on hatches, and to get in the mood for trying his rivers. He certainly is a living presence on the rivers here. Mike is a real admirer of the book, and it doesn't seem like Vince will ever be forgotten around here. That reminds me, I enjoyed your tribute a lot. I must make sure my brother, who used to correspond with him, sees it.

Keep in touch. Our best to the family.

Sincerely,

Paul

Paul Schullery

Datus C. Proper
American Embassy
Apartado 2103
1103 Lisboa Codex

FOR PUBLICATION

TRYING HOOKS

There was a time when the strength of fishhooks seemed to me as important as, for example, the sex of angels. The latter topic has not excited me yet, though one day it probably will. The former attracted my abrupt interest on May 12, 1972. That was the first day on which a trout in the Meath Blackwater opened one of my hooks. For the next three weeks, I took my annual vacation to try conclusions with those trout. By the end of May, as I recall, there were eight or nine flies with opened hooks stuck into a sheepskin pad on my fishing waistcoat. The bristly waistcoat took on the airs of a hair shirt.

It was not sheer stubbornness that made me keep using those "1X-Fine" hooks: a couple of alternatives were little better. The only reliable hooks available to me were some that had been sold by Hardy's in the 1930s. Ned Maguire gave them to me, one by one, with an "I-told-you-so" look clearly visible under his Irish cap. He had indeed told me so, but he had not offered many choices. He had scarcely enough of the Hardy hooks left to make a rattle in the box. They were a bit heavy for dry flies, but a trout caught anywhere in the mouth with those old hooks was a trout in a lot of trouble.

In June, back at my home in Dublin, I tested a lot of hooks by a process that was more exact, if less exciting. Next year my score on the Blackwater was better. Well, at least the weak link was less predictable. The Blackwater fish were heavy, strong, and wild, yet

they demanded small dry flies. A tougher laboratory would be hard to find.

With that background, I welcomed a letter by Alan Bramley of the Partridge hook company in the January 1980 issue of this magazine. He asked for suggestions on a laboratory that could do hook-testing properly. To my knowledge, no replies have appeared in print. Nor have there been discussions of hook-testing in any of the publications I have seen, British or American. We do need a strength-test for hooks. We may need it even more than a strength-test for leaders. From my own tests, it appears that the hooks we are using now are often weaker than those of fifty years ago, while leaders -- again on the average -- have become stronger. No wonder that my Blackwater trout found hooks to be the weak link.

As it turns out, strength-tests of hooks are not very difficult, but neither are they straightforward. In the end, I did three other tests before getting to strength.

a) First weight had to be determined, because it is easy to achieve strength with excessive weight. Hooks for big wet flies and lures seldom pose a problem.

b) Size, oddly enough, is more difficult. It would make no sense to compare a size 14 Partridge (which turns out to be a real size 14 on the Redditch scale) with a size 14 Mustad in Model 94840 (which is a size 12 on the same scale).

In the course of measuring hooks, I stumbled on several scales. Only one -- from Redditch -- has been available for generations in precise, published form, so that anglers in Wellington or Washington could determine hook sizes with that precision instrument called a ruler. The other scales can be lumped together in the Alice-in-

Wonderland category: they mean anything their perpetrators say they mean. This is the short version of a long subject. It should at least make clear why the second step of my testing procedure was to determine the Redditch size of each hook.

c) While measuring hooks in thirty-seconds of an inch, it occured to me to check dimensions other than their length (which, with eye excluded, determines the size by the Redditch scale). Then with dimensions available, it was possible to calculate hooking leverage. The idea was not original. It came from H.G. McClelland, Henry P. Wells, and Cholmondely Pennell. Later I saw a helpful letter by Richard Walker in this magazine.

All this grew into the chapter of a book, and I never did describe the details of the strength-testing process. So here they are.

Scotcher had a strength-test for hooks in about 1810. "I usually try them well", he said, "by putting their points in a bit of board, and gently pulling..." With experience, that provides a useful comparison between hooks. A hard board is a fair approximation of the bony parts of a trout's mouth, and those are the parts that open most hooks in practice. My last series of tests was done on the hard clip-board used to hold my notes. A few sheets of bond paper secured the point of the hook (like a fish's skin), while the hard board prevented further penetration. Since no hooks could penetrate, the comparison between hooks was fair.

It remained to add a means of measurement. A spring balance of the kind used for trigger-pulls did a fair job, but I eventually acquired a set of precise brass weights. (You could

do it more cheaply by weighing out little bags of shot.) With the hook's point caught in the testing board, the eye was connected to a tray containing the weights. The best connection I found was a "Croydon" fly-tying vice, which gripped the hook-eye quickly and securely. Best of all, the vice had a bend that precisely duplicated the angle of most hook-eyes. The result was that the hook shank was pulled directly downwards by the weight. That gave me a 90-degree angle between the testing surface and the stressed hook-shank. The hook could be prevented from touching the board anywhere except by the point, which is important. All this will be more easily understood from the accompanying illustration.

The most difficult part of the process is deciding when the hook has failed. One cannot, as I had expected at first, simply "fail" the hooks when they break. They fail in three ways:

-- The best of them (for my money) usually do break when the stress becomes excessive.

-- The worst hooks have a soft temper and simply straighten out permanently. One kind that did this was the "house brand" of an English fishing-tackle firm. The maker was not identified. He cost me two Blackwater trout, because (like most anglers) I did not test first.

-- The most deceptive of hooks are those with a springy temper. Some of them open far enough to lose your fish, then spring back almost (but seldom exactly) to where they started. These hooks, I now suspect, account for some of the trout we lose after what seems to be a confident rise and a well-timed strike. The problem occurs with many of the light-wire Mustad hooks, but some of the

extra-light Partidges for the American market are also springy. I am not sure that springiness can be avoided with very light wire, so it should not be considered a manufacturing defect.

The problem of springy hooks made it necessary to accept that hooks had failed when they reached a certain angle. I chose forty-five degrees, for two reasons: it was easy to see how a trout could escape at that angle, and most hook-wires had yielded permanently by then. (The point would not spring completely back to its original position parallel to the shank.) To some extent the choice was arbitrary. As a matter of opinion, however, any reasonable choice would have to be close the angle I used.

Most dry-fly hooks are small objects, and it is not easy to see when they have opened by precisely forty-five degrees. I started by mounting a needle in my testing-board at a measured angle. For most tests, however, I estimated the point of failure. In the best of the hooks tested, the variations in strength from one test to the next were slight, leading me to think that my procedure was reasonably reliable.

Nevertheless, this was the part of my procedure which was most open to criticism. A hook manufacturer or laboratory could afford to set up a more exact apparatus, perhaps based on a commercial thread-testing machine. He would want to secure the shank of the hook in a rigid device, so that the shank would always be pulled in a direction precisely parallel to the point of the hook. Then he would want to measure the angle of hook-failure precisely.

But the purpose of all this would be to ensure precision and uniformity, not to duplicate fishing conditions. Your hook in a trout's mouth is pulled in any old direction. Home tests can, I think, come very close to real life.

A manufacturer doing tests would also want to take a random sample from several different batches of hooks. I took samples from only one or two boxes. Even then,one by-product of testing was an expensive drawer-full of hooks. Many of them are so weak that they will not be used.

The tests produced a few results that could not have been achieved by fishing.

First, I concluded that for big fish, a hook in a true size 14 ought to test three pounds by my procedures. (As elsewhere in this article, the first person singular is intended to signal that the opinion is wide open for disagreement.) On the stream, three pounds of pull seems enough to set a hook of approximately that size in almost any part of the mouth of any trout. A smaller hook needs less strength, and a salmon or mayfly hook needs more. When a strong hook penetrates fully, its resistance jumps enormously, to an amount that exceeds the strength of any practical leader. This shows the importance of testing under "worst-case conditions", as I did.

It seems a fair guess that hook-makers will be less than enthusiastic about labeling their product with the results of a worst-case test. But a best-case test, with fully penetrated hooks, would produce very high figures that would be meaningless for fishing.

Of the hooks tested, only the Partridges labeled "down-eye trout" (sometimes advertised as "wide-gape"), exceeded three-pound test. They are a little heavier than I like, at 0.30 grains per hook in

size 14, but good dry-flies can be designed around them. They are, in fact, a great deal like those old Hardy hooks, probably by no coincidence. They are worth using on the Itchen at Abotts Barton, the Firehole in Yellowstone Park, or any other river where heavy trout take small flies.

Before tying flies on these hooks, I bend them in my vice to eliminate the offset point. It can twist fine leaders in the air and make nymphs behave oddly when "inducing a take", to say nothing of fishing downstream.

The hooks I tried first on the Blackwater -- Mustad 94840 -- opened in my tests at less than a pound and a half in Redditch size 14 (labeled size 16). The same hook in true size 12 (labeled 14) still opened at less than two pounds. These hooks will usually hold the small trout I am fishing for these days in Portugal. Even so, a lot of hooks testing under two pounds seem to open while being removed from trout or branches, and one worries about the occasional large fish.

Another Partridge hook tested at just over two and one-half pounds. It was labeled "Down-Eye Round", though the bend seems to be a modified sproat. This hook holds up well in practice and seems a good compromise. My box is labeled "14" but contains 13s. Fair enough: manufacturers need some production tolerance, and one size seems reasonable.

Having discovered the strength of hooks, it is logical to find out how much force is needed to penetrate a trout's mouth. At least, it is logical to me. My wife does not take seriously my experiments with a dead fish, hook, and spring balance. She hints that I am the first lunatic in history to have stumbled on

this depravity. I shall be grateful if some reader can cite evidence of another unsung scientist who has tested the mettle of a trout's jaw.

In the kitchen as this is written is a half-pound trout who, like me, is ignoring scoffers. A hook penetrates most of his mouth fully with less than eight ounces of pressure. In the roof of his mouth there is a bony ridge (the vomer) that cannot be penetrated with any reasonable pressure. If a hook skids off that ridge without bending, however, it will penetrate softer tissue in front or to the side.

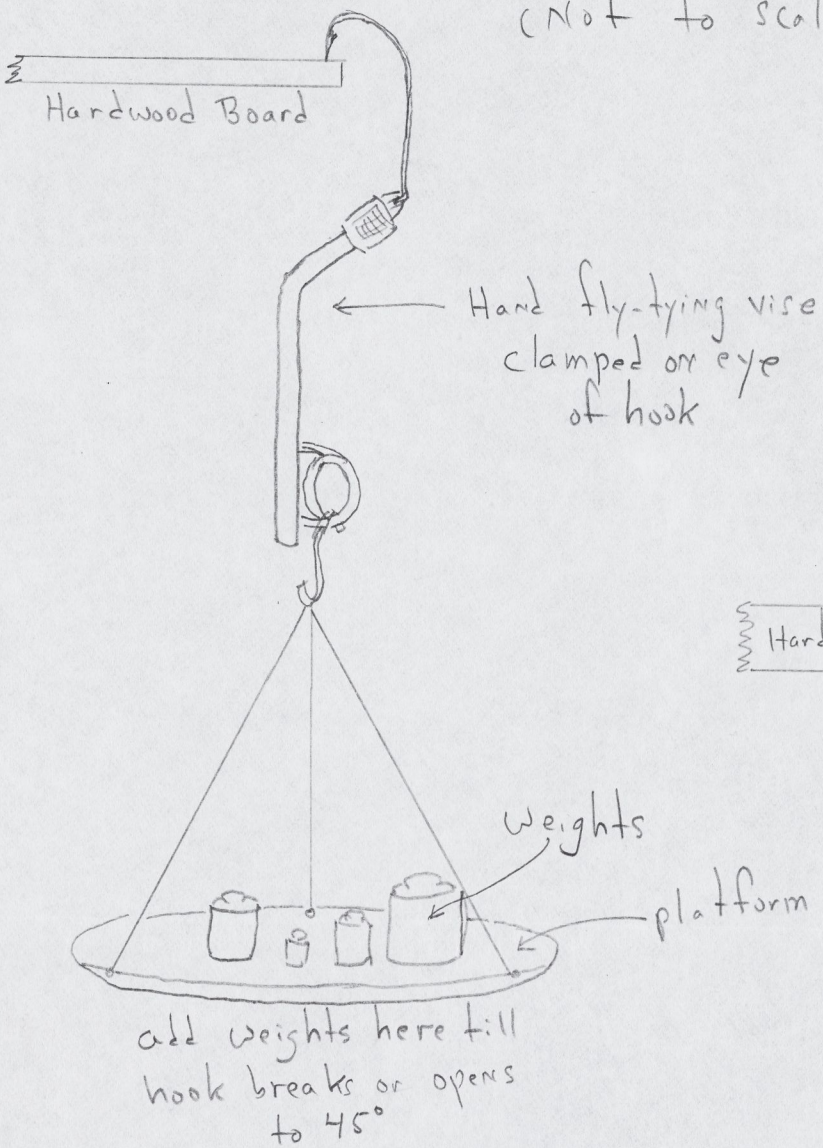
The trout's lower jaw, well back in the scissors, has a bone that can only be penetrated with two pounds of pressure. Failure to penetrate would often mean a lost fish, as the bone is at the edge of the jaw. This is a worst-case test again,but a reasonable one: a well-timed strike might well involve that bone. So the test does seem to support what I have found on the stream, which is that a hook of less than two-pounds-test is unreliable.

My tests also showed that the barb of the hook can have an odd function that I have not seen mentioned in print. Some of the very springy hooks opened to a full ninety-degree angle. The point was then completely disengaged from the paper on my clip-board, but the barb hung on. (See illustration.) It seems possible that the barb could save occasional fish in that fashion, or (more likely) by preventing the point from backing out under pressure. But this would <u>only</u> arise with hooks of inadequate strength. With strong hooks, removal of the barb seems to cause few problems.

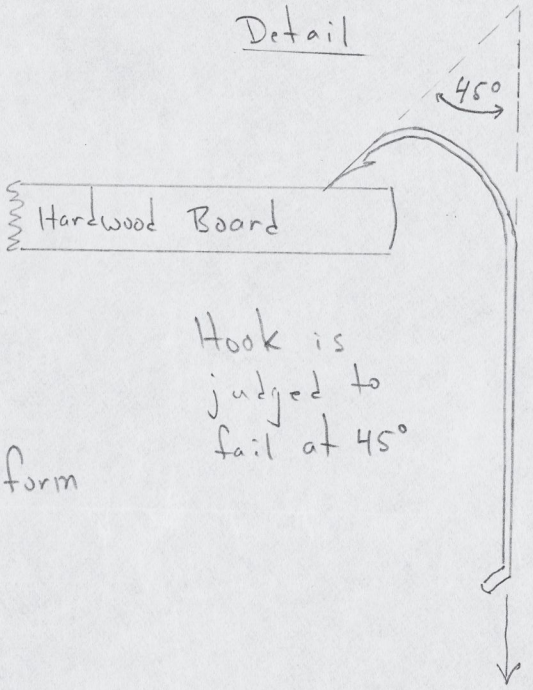
The weak point in hooks is --usually -- just at the top of the bend, where it joins the shank. In my tests, however, some light hooks broke in the middle of the shank, well forward of the theoretical weak spot. As it happened, these hooks had flat-

forged shanks. Possibly there was no connection: the forging ought to strengthen the shank, not weaken it. Still, I recall that Ned McGuire used to frown every time I produced a flat-shanked hook, and I am not sure that he was wrong. He and the Blackwater trout won most arguments.

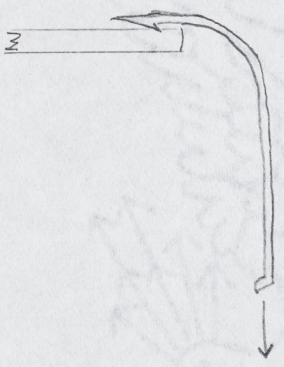
Method of Testing Hooks under Worst-Case Conditions (Not to scale)



Detail



Detail: An unusual function of the barb



Some extra-springy hooks can open 90° without breaking. At this point, only the barb is caught on the testing surface.