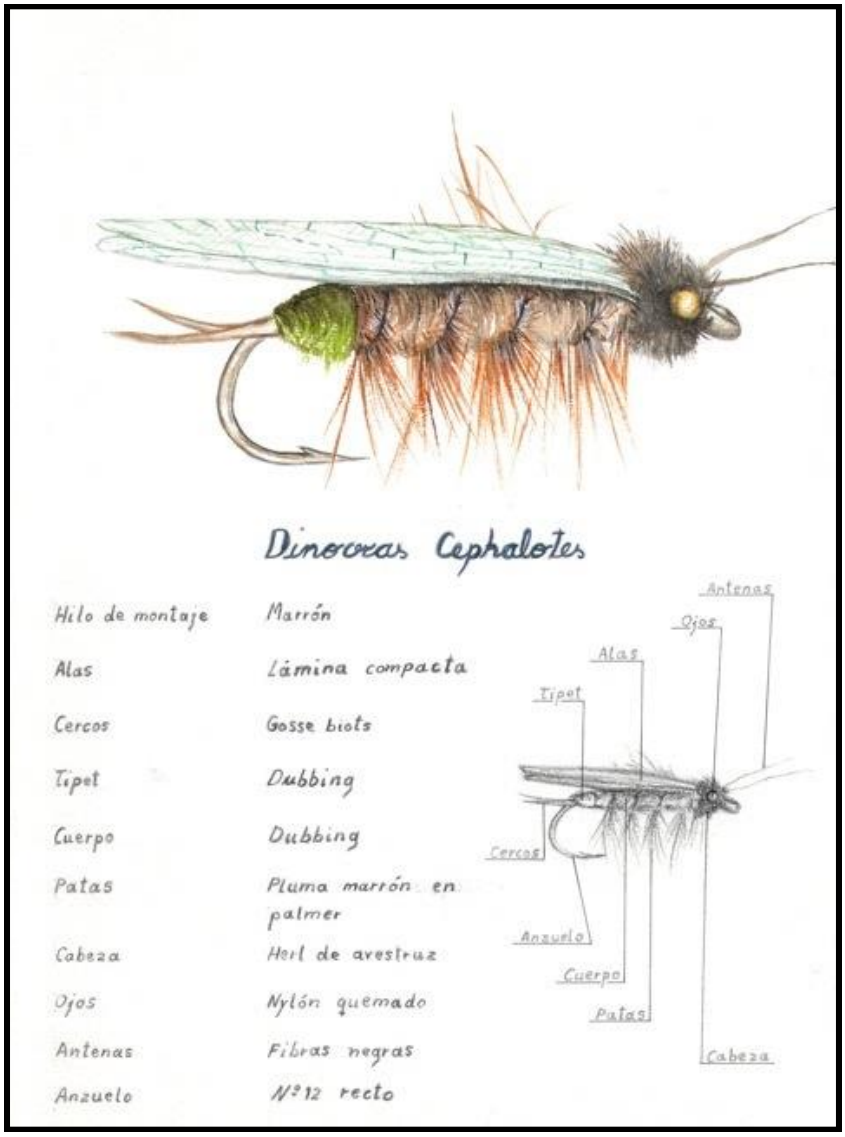
Power Fibers Online Magazine

July 2018 (Volume 60)

Dedicated to the Making of Fine Bamboo Fly Rods

Inside this issue:

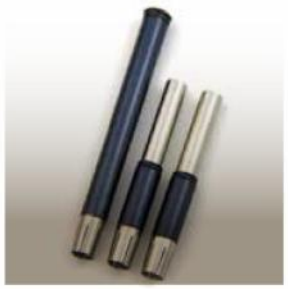


Watercolor on paper courtesy of Alfonso Jaraiz Puig (http://artificialfliesdrawings.blogspot.com)









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The First Cast

Todd Talsma, Editor

There is a lot of information to digest in this issue. I feel it's a pretty good balance of theory and practice. Let me know what you think.

I have a projects in the works that I'll be putting into future issues of *Power Fibers*. This project will be a series of interviews with as many rodmakers as possible. I'm going to be contacting each rodmaker with an initial set of questions and then see where the interview goes from there. I have a list of rodmakers I've identified, but I'm always open to adding to this list. These don't have to be well known rodmakers, I'm looking to interview as many rodmakers as possible. If you'd like to suggest any rodmakers, I'm all ears! In addition, if you've had a question you'd always wanted to ask these rodmakers, let me know and I can add it to my list of standard questions. This is something I've wanted to do for a long time and think it's something that's overdue as well. I've already sent out several inquiries to rodmakers and have received very positive responses. Hopefully, as these interviews are completed and I get them into future issues, you'll enjoy them. I know when I get a chance to "talk" with rodmakers, I always find it enjoyable.

I hope everyone has heard about the latest issue from the Italian Rodmakers group. You can find it at http://www.rodmakers.eu The issue has many good articles. If you haven't read all of the issues from the IBRA group, you're missing some very good reading. There have been many interesting thoughts on rodmaking published in the *Bamboo Journal*. There is a lament in the editorial from the current issue where the editor talks about the struggle to find material to publish. He then goes on to state he still thinks there is plenty of this material left to be discovered. At times, I wonder about material, but then there are new or returning authors who come up with new or improved thought when it comes to making bamboo rods. I agree we have a lot of information we can still use to learn more about rodmaking.

I can always use more ideas, feel free to contact me. If you have a suggestion about improving *Power Fibers,* drop me an email at the following email address: power.fibers@bamboorodmaking.com

Warning!

Because many aspects of bamboo rodmaking bring the maker in contact with machinery, bladed tools, volatile chemicals and gases, the editor and advisory board of *Power Fibers* ask you to exercise the utmost caution when attempting to build or mimic any devices or activities mentioned in this magazine.

Please have any devices you build and use in your shop checked by a safety professional before attempting to use such devices. This is to guarantee your personal safety and that of others around you.

If you choose to build any device or use any technique found in this magazine, you are doing so at your own risk.

Power Fibers

Online Magazine

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Making the Fiberglass Ferrule

Text and photos by Bob Hallowell

I have been experimenting with fiberglass ferrules, with a lot of discussion and excess material from my friend Mike McFarland. I finally settled on this method as it works well for the quads and hexes I make. I am sure it will work for other strip configurations.

The basic ferrule is cut from a thin walled shallow tapered blank or a vintage scrap rod. In this article I used a new white glass blank with ferrule stock. If you don't have access to ferrule stock make sure you double wall (a piece inside) your spigot.

I cut the male .875” long, this gives me .5” for the spigot to be glued in and .375” to be glued on to the cane. For smaller ferrules like this one I made the female 1.375”, this leaves 1” for the female to receive the spigot and .375” to be glued to the cane. The spigot on this rod extends 1” from the male with a designed ferrule gap of 3/16”. Depending on the size of ferrule being made the spigot length and female length can be adjusted.

I round .375” of the cane and glue the spigot in as I glue the ferrule on to the cane. I use JB weld but any high temperature epoxy will work. Be careful when using thin walled blanks, if you force them on the cane or force the spigot the fiberglass can crack.

(Continued on page 6)

Once the epoxy is cured I cut a piece of prepreg that is .375" wider than the ferrule, then I wrap it around the ferrule three times. I wrap the prepreg from the end of the ferrule to .375 on to the cane. It adheres extremely well to the cane and takes shape of the cane. I like to put a little bit of spray adhesive on the ferrule for the prepreg to stick to as I start to wrap. It sticks to itself once the wrap overlaps. Once this process is complete I wrap on the shrink tape, starting on the cane to the end of the ferrule and back on to the cane. Plug the end of female and wrap the spigot with masking tape as some of the resin will leave the prepreg.

(Continued on page 7)

You are now ready to bake your ferrules. I have done this with a heat gun jig I made but now I use a mica strip oven. The method does not matter as long as you can hold the temperature between 250-275 Fahrenheit for 30 minutes. After baking you can remove the shrink tape, file and sand smooth.

Lastly the finishing, I like to use honey amber TransTint dye that is readily available. I brush on and wipe off the spigot just to add some color. The rest of the ferrule gets a coat that does not get wiped back off, this gives you the dark tobacco glass look. I stick it on my rod dryer to dry. Once dry I wrap both ends of the ferrules, in this case colored silk on the cane transition end and natural silk for a clear look on the other end. The ferrule now gets a thin coat of epoxy and it is complete.

(Continued on page 8)

Material Resources:

Fiberglass prepreg- any woven prepreg with a thickness around .005 should work.

https://www.rockwestcomposites.com/materials-tools/fabrics-pre-pregs-tow/prepregs/14015-d-group

Shrink tape
https://www.rockwestcomposites.com/1536-d

Fiberglass stock
I have used both vintage rods scraps and new blanks. Here is a link to one
http://theanglersroost.com/products/fiberglass-blanks/fiberglass-blanks-various-sizes/

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Finding the Main Characteristics of Your Rods

Text and figures by Daniel Le Breton

This article describes the method that I use to characterize fly rods. Here is a description of the materials needed:

- Two clamps on a table, or a vise to hold (gently) the rod in horizontal position.
- A series or two of precisely measured masses (with a jewelry scale for example) with a maximum mass of approximately 1 oz (I use 5.0, 10.0 and 20.0 grams masses, and 30 grams is the maximum I use in practice). Using rounded values is not mandatory but it is very important to maintain precision when calculating the characteristics of the rod. So if you use 4.8 grams; 8.6 grams; 12.7 grams, etc., it is all right.
- A measuring tape to get the rod deflection (preferably in millimeters).
- A stop watch (I use my smart phone) to measure the rod vibration frequencies. If you have a high speed camera that will be better to capture the elapsed time for a defined number of cycles (I use 10 cycles with a stop watch).

Below are a couple of pictures showing my tools: two clamps, a couple of series of lead weights which I tuned to exact values (5.0 grams; 10.0 grams, 20.0 grams), but you just need just one series. However, with a couple of series I can make measurements for 0, 5, 10, 15, 20, 25, 30 and 35 grams by suspending several masses from the tip top guide. For stiff rods, I can go up to 70 grams with the second series of masses. You can see the little hooks which help me attach the weights to the tip top guide of the rod.

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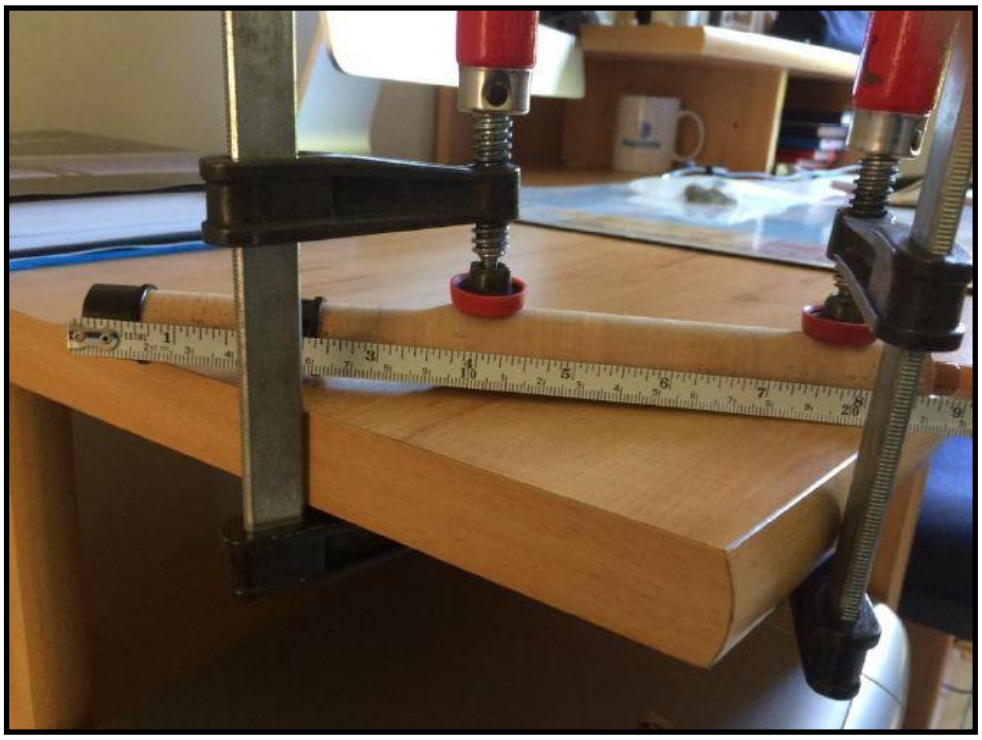

Shown above is how I clamp the rod: I use the measuring tape to place the upper (right) clamp 8 inches (20 cm) from the butt end. In this photo the rod is very small so this clamp is high on the handle. I do not tighten the clamp on the handle too much, but just enough to avoid any undesirable motion. If you prefer another set-up (e.g. the higher clamp in the middle of the handle), it will slightly affect the measurements for short rods, but nothing critical.

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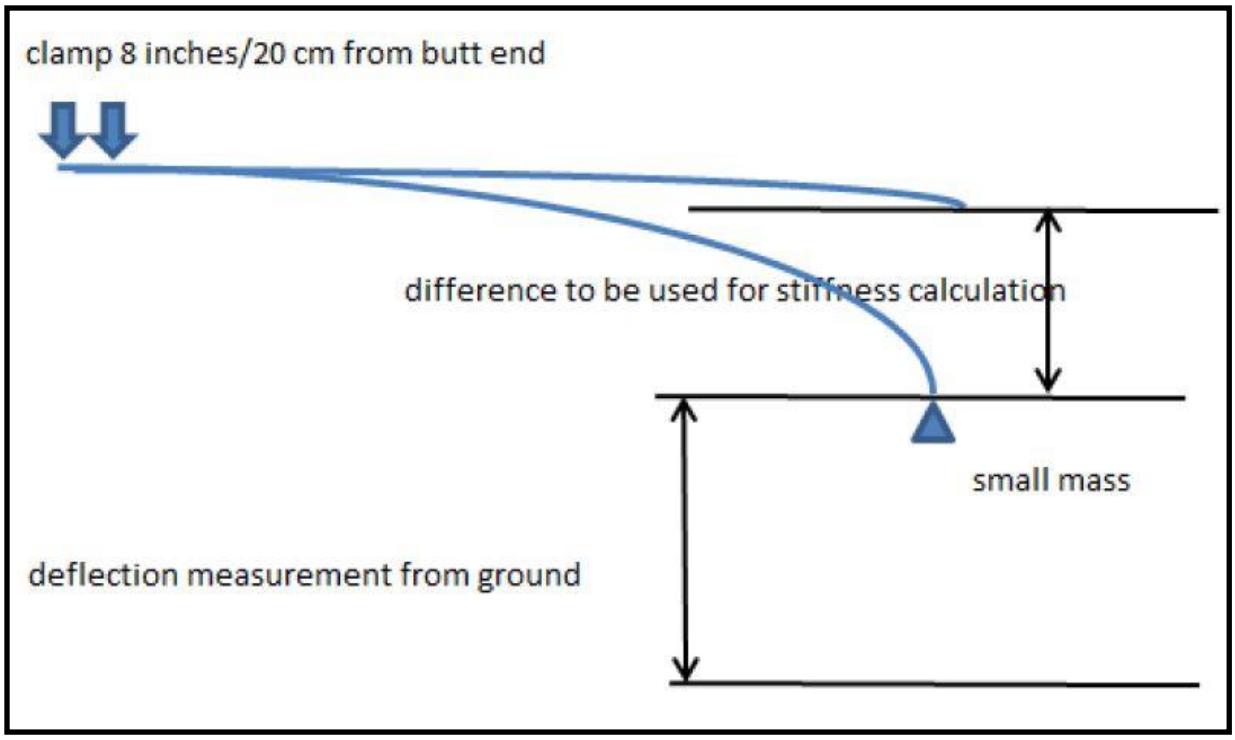
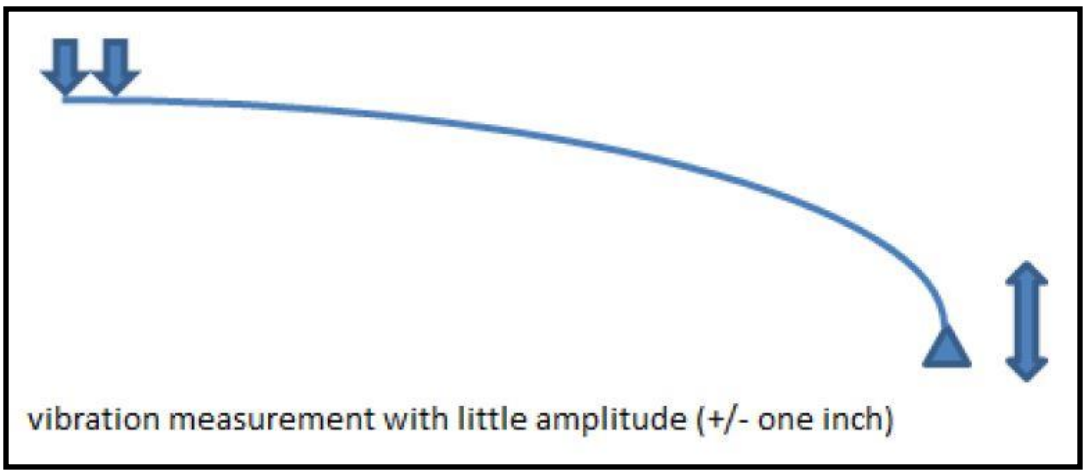
Deflection measurements are easy to perform:



You just have to find the position of the tip from the ground, vertically, for each mass in your series of masses.

For vibrations measurements, you do not need large amplitude, a small one is fine.



Note: It is not always easy to measure the frequency for no load if the rod is fast! This is where the high speed camera is useful.

I measure the time it takes for 10 cycles of vibrations four times and then I calculate the average value. I start with the greatest mass. With a high speed camera you need a reference position somewhere behind the rod (e.g. on a wall or on a board) to count the cycles. Convert the number of camera frames required to record one cycle into time per cycle by knowing the number of frames your

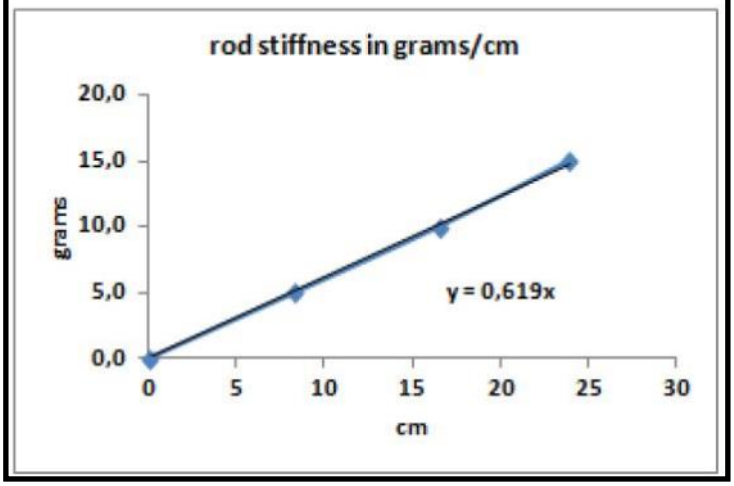
(Continued on page 13)

camera takes per second. A minimum speed of 200 frames per second is needed (in that case, one frame corresponds to 0.005 s). You need to identify the frame number at the beginning and at the end of the cycle, and then you calculate the difference and multiply that by the frame speed to get the time per cycle. To vibrate the rod, just pull the mass down a little bit. This suspended mass must not swing around the tip top guide, a little bit of practice will teach you how to do that.

Now the calculations:

Rod stiffness: measure the position of the deflected tip relative to the ground for each of your series of masses. Calculate the difference between the weighted position and the position of the tip with no load and plot the mass versus the deflection in a spreadsheet. You should get a nearly straight line, the slope of which is the stiffness you are after, 0.62 g/cm in this example for a small rod (#3 line; 7 foot).

grams	0,0	5,0	10,0	15,0
cm	61,9	53,6	45,4	38,0
difference	0	8,3	16,5	23,9



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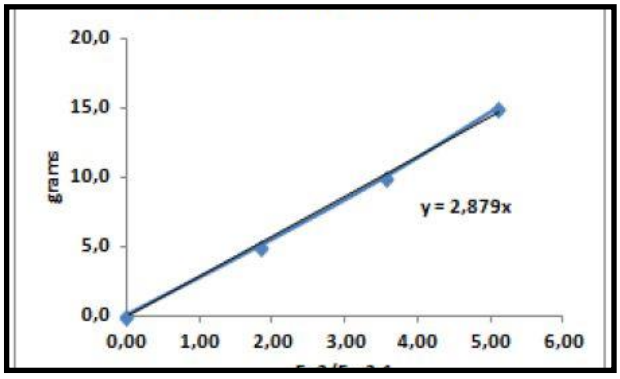
The table below provides a rule of thumb for estimating the line number for the rod. In the table you will see a recommendation for the maximum mass to be used for lines for trout rods.

units	Up to line #3	#4	#5	#6	#7
Grams	15	20	25	30	30
Oz	8/16	11/16	14/16	1 1/16	1 1/16

If you want an estimate of the mass in grams for the first 30 feet of the suggested line for the rod just multiply the g/cm stiffness value by 10.55: in this example 0.62*10.55 = 6.54 grams. It corresponds to a number 3 line (6.48 grams). If you use oz/in and grains, the stiffness of this rod is 0.0556 oz/in and to get the corresponding line in grains you have to multiply by 1800: 0.0556*1800 = 100 grains.

Rod speed and mass in motion: there is an intermediate calculation to be made. Where F0 is the frequency of the rod without load (2.39 Hz in the table below) and Fm the loaded frequency for mass m, calculate F02/Fm2 – 1 and plot the mass against this value on a spreadsheet as illustrated below. For the rod described above we find the equivalent mass m0 = 2.88 grams.

10 cycles				
grams	0,0	5,0	10,0	15,0
time 1	4,20	7,03	8,96	10,26
time 2	4,23	7,07	9,06	10,35
time 3	4,15	7,07	8,91	10,43
time 4	4,15	6,98	8,83	10,31
average	4,18	7,04	8,94	10,34
Fm (Hz)	2,39	1,42	1,12	0,97
Fm^2	5,72	2,02	1,25	0,94
F_0^2/F_m^2	1,00	2,83	4,57	6,11
F_0^2/F_m^2 -1	0,00	1,83	3,57	5,11



For example: if I take the unloaded case, the average time for 10 cycles is 4.18 s, then the corresponding frequency is 10/4.18 = 2.39 Hz. For 15 grams the average time is 10.34 s so the frequency is 10/10.34 = 0.97 Hz. We need to compute Fo2/Fm2 – 1 = (2.39^2)/(0.97^2) – 1 = 5.11 and plot that value on the graph at 15 grams.

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How to correct the equivalent mass for length and stiffness for comparing rods? Here are the basic equations using power functions:

$$m_0\ corrected = m_0\ measured * \left(\frac{reference\ stiffness}{measured\ stiffness}\right)^{0.5} * \left(\frac{reference\ length}{rod\ length}\right)^{2.5}$$

$$F_0\ corrected = F_0\ measured * \left(\frac{reference\ stiffness}{measured\ stiffness}\right)^{0.25} * \left(\frac{rod\ length}{reference\ length}\right)^{1.25}$$

These functions come from physics considerations. Now be careful with units used for ratios since everything must be consistent. Here are the values I am using:

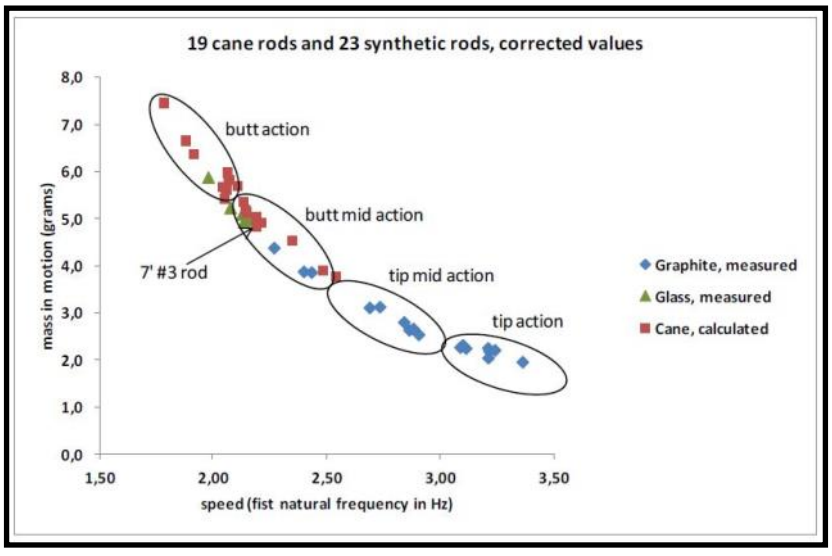
- Reference stiffness is 0.85 N/m = 0.866 g/cm = 0.0776 oz/in.
- Reference length is 2.44m = 244 cm = 8 feet = 96 in.

A few practical conversions if needed:

1 oz/in. = 11.16 g/cm = 10.95 N/m
1 oz = 28.35 grams = 0.02835 kg
1 grain = 0.0648 grams

If you want to compare your data with mine you will have to use grams for equivalent mass and Hz for frequencies. Here are the corrected values for the above example:
mo corrected = 4.7 grams and F0 corrected = 2.21 Hz

It means that a similar rod of 8 foot length with the reference stiffness would have those characteristics. Referring to the illustration below for a number of rods (42) which I already published, you can see that this rod is in the "butt mid-action" range. Considering its actual natural speed (2.39 Hz), it is a rod slightly on the slow side. Rod natural speed can cover a range starting from 2Hz (slow) and ending at 3 Hz or a little more (fast).



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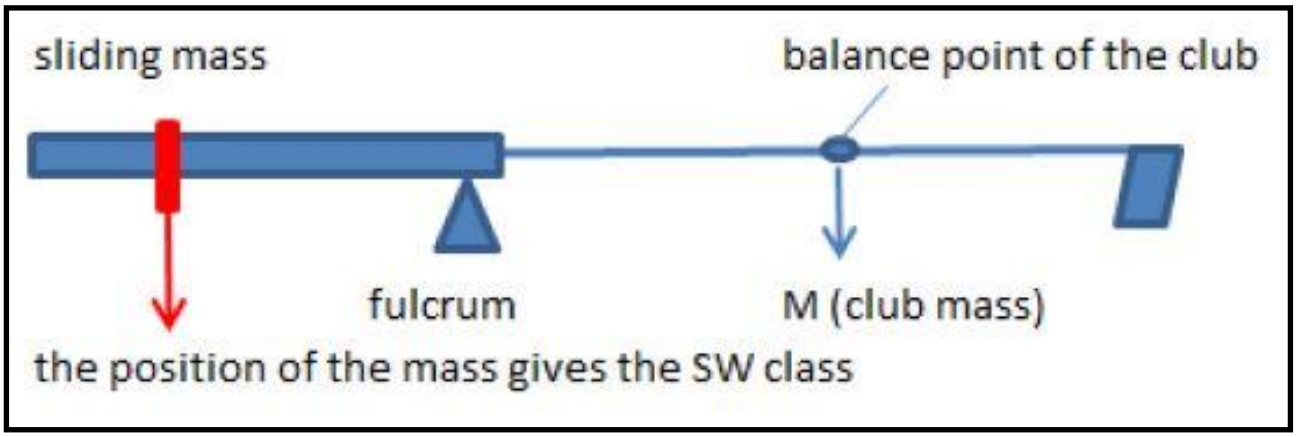
0,01,02,03,04,05,06,07,08,01,502,002,503,003,50mass in motion (grams)speed (fist natural frequency in Hz)19 cane rods and 23 synthetic rods, corrected valuesGraphite, measuredGlass, measuredCane, calculatedbutt actionbutt mid actiontip mid actiontip action7' #3rod.

Because of the fuzzy limit in between such action classes, it would be better to keep the value of the corrected "mass in motion" as a reference.

Swing weight (SW) and moment of inertia (MOI), the possible confusion

Swing weight is an expression that originated with golf clubs; it was created nearly a century ago as a way to overcome the difficulty of measuring the moment of inertia of shafts. MOI is the key inertial parameter for quantifying the resistance to rotation of an object. However, we tend to use the words "swing weight" instead of "MOI" when talking about the subject which can create confusion. SW, as defined by golfers, is not an estimate of MOI, it is instead a mass balance criteria: you define a fulcrum point and you use a defined mass which you can slide along the handle of the club. The position of that given mass when the club balances about the fulcrum determines the swing weight class of the club. Here is a simplified scheme to show how the swing weight of a golf club is measured (in practice the sliding mass is on a scale on which the club lies).



Today there are precise means to measure the MOI of golf clubs (e.g. Auditor speed match system).

We face the same measurement difficulty with fly rods, and there are two possible approaches: measuring the mass balance or the MOI. Here is the mass balance methodology used by "The Yellowstone Angler" when they run their "shootouts": the rod is placed on a scale located at the desired balance point (the middle of the swell of the handle, by definition) where one can read the force applied when someone holds the rod in the horizontal position by pushing down on the butt end.

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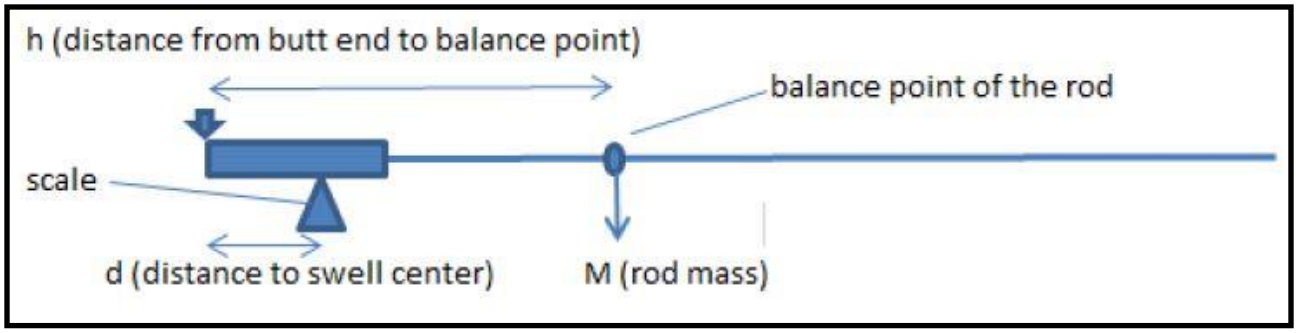

In fact you do not need any scale, a simple calculation shows you that the SW you should read on the scale is:

$$SW = Mh/d$$

In practice you actually find a SW value three to four times the rod mass value. The problem with this method is that two very different rods can have similar SW with this test.

If you want to have a try at calculating the MOI of fly rods, I suggest using the following exact method developed by my friend Gordon Judd. It is applicable to any rod, and provides a precise value for the MOI at the butt end of the rod. There is an approximate methodology for modern rods which you can find on the internet: http://www.sexyloops.com/articles/swingweight.shtml, which gives comparable values.

You have to suspend the rod vertically (you may need a high ceiling somewhere, I do that in a staircase) and use the rod as a pendulum with the butt end as the rotation point: once the rod is suspended you rotate it by pushing laterally on the handle so that the tip moves by more than one foot. Waiting for 10 cycles will show you how friction can damp the pendulum; this is why you

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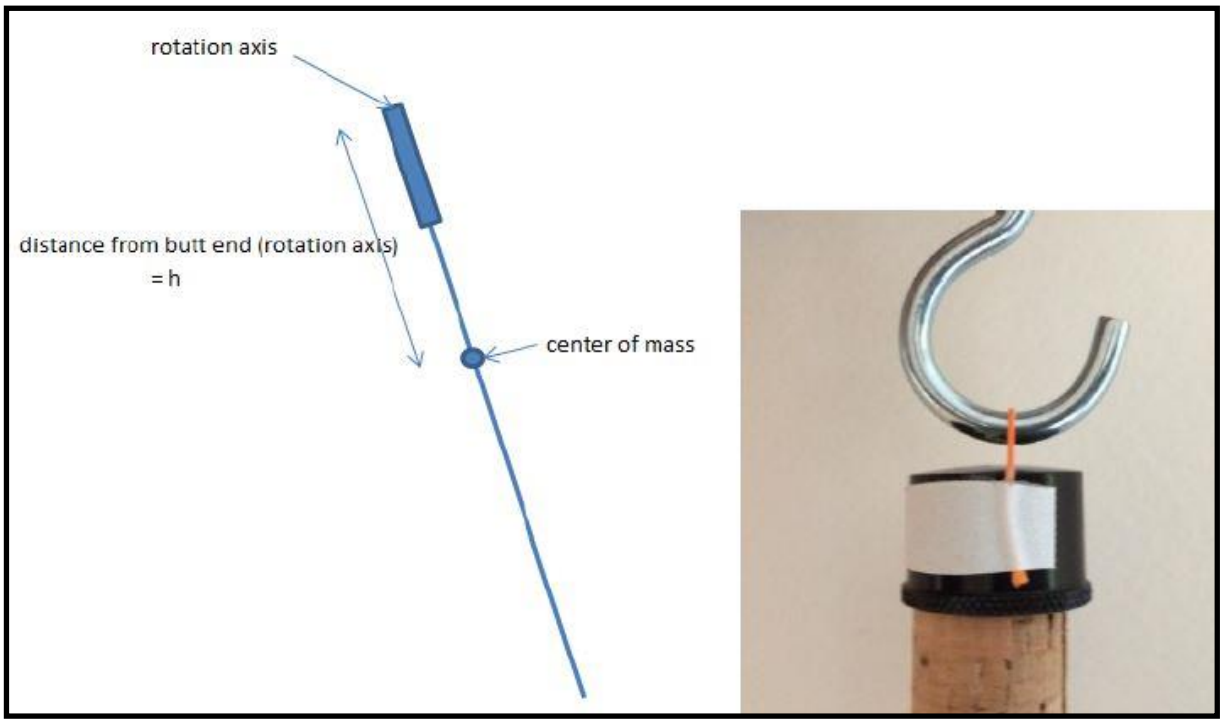


need a minimum displacement at start. To allow the rod to rotate about some axis (e.g. a hook), make a small loop of string and tape it to the butt cap, something like that in the previous photo which shows a light system for a small rod; you will have to make something more substantial to avoid the string slipping with a heavier rod. Keep the loop as close as possible to the butt end of the rod.

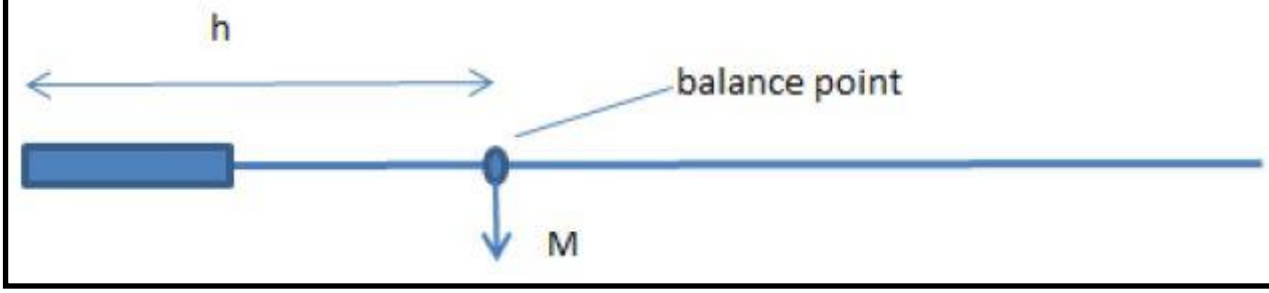
The frequency (F) of such a pendulum is about 0.5 Hz (it takes about 20 seconds for 10 cycles), so it is pretty easy to measure. I measured frequencies in the range 0.425 Hz to 0.465 Hz. The formula for the Moment Of Inertia at the butt level is:

$$MOI(butt\ level) = \frac{Mgh}{4\pi^2 F^2}$$

g is the constant of gravity (9.81 in the international unit system). M is the mass of the rod. You can use grams as the unit to compare with other data (Sexyloops database), but h must be in meters and F in Hertz (the reciprocal of a second). It means we use grams*square meter to determine the result and a modern trout rod has a MOI of about 70 gm2. The little example rod that I measured has a pendulum frequency of 0.463 Hz and its MOI is just below 43 gm2.

There is a shortcut which provides approximate values, it is OK to get an idea of the MOI but it is risky to use it for comparisons. If you consider that the frequency is nearly constant, let's say that the average of the range I measured is 0.445 Hz, then you can calculate a simple estimate with:

$$MOI(butt\ level) = 1.25\,Mh$$



When using this simplification, I find an MOI of 46 gm2, some 8% higher, which is too much of a variation for an accurate comparison between rods.

So far we have estimated the Moment of Inertia with reference to the butt end of the rod, whilst we actually hold it somewhere along the handle. We can calculate the MOI based upon where we ac-

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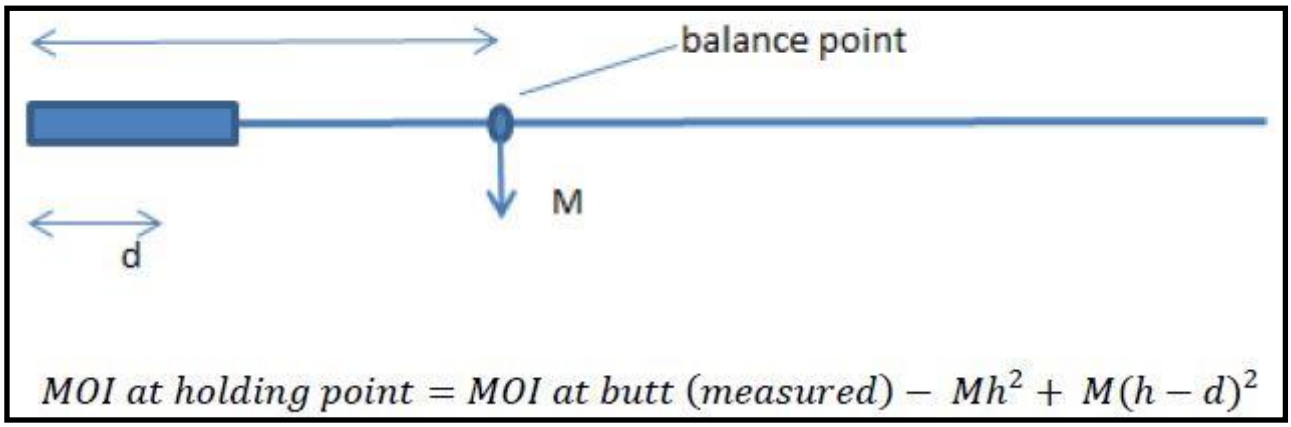
tually hold the rod as follows: suppose we hold the rod at distance d from the butt, then we have:



Technically speaking, comparison of MOIs calculated in the middle of the handle would be better than using the MOI at the butt level.

You may also use the leverage effect due to the mass of the rod when you hold it horizontally, the torque needed for that can easily be calculated (here I am skipping the constant of gravity to keep simple units):

$$torque = M(h - d)$$

Technically speaking, using "torque" is better than using a simple "mass balance". While it corresponds to the feel you get from holding the rod horizontally without a reel, it does not correspond to the actual MOI.

The question arises as to whether to include the reel or not. Here we are aiming at a rod characteristic, its MOI, and this is different from trying to find what we feel when holding the rod and reel horizontally.

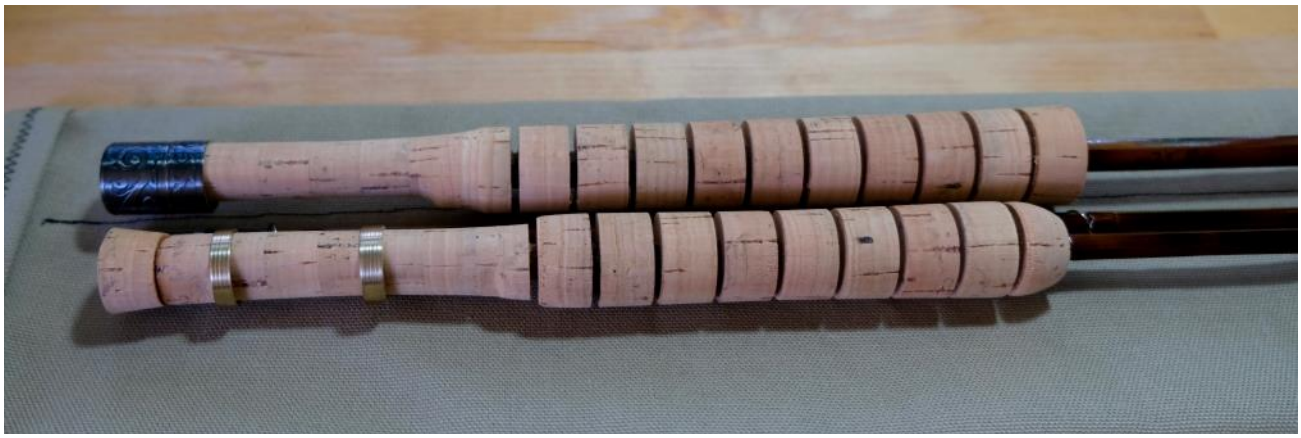
Including the MOI of a reel is possible but it blurs the difference between rods. The suggested "torque" methodology is an example of the least you can do for rod comparison, if you cannot measure the actual MOI of the rod.

There is nothing complicated in performing these tests; you can use some spare time during the winter months for that! I have been using most of these tests for some 40 years.

Daniel Le Breton, 11 November 2017

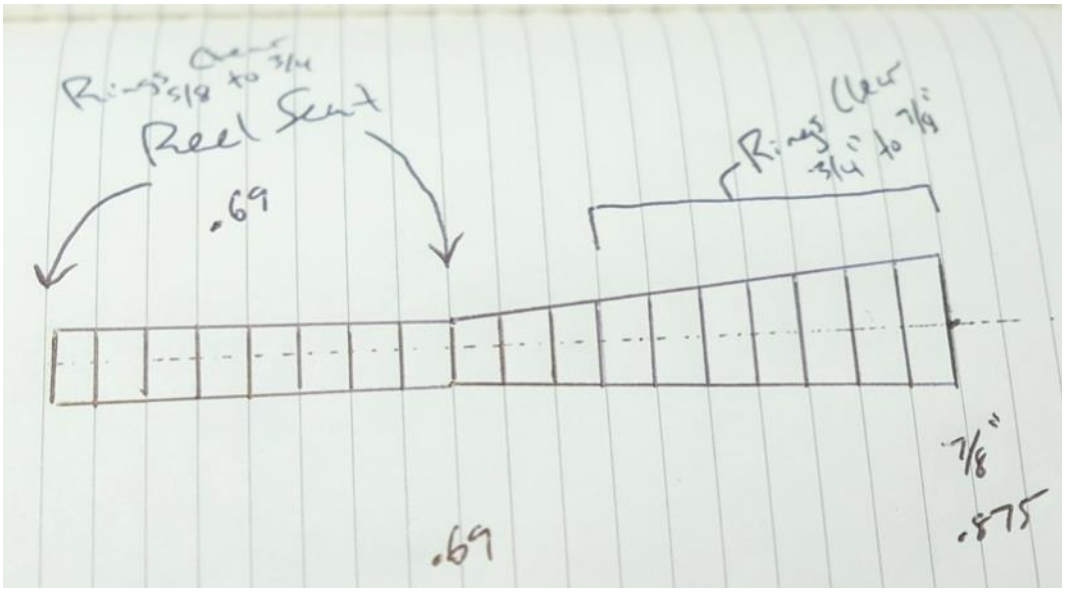
Making a Ventilated Grip

Text and Photos by Craig Crumbliss



I made my first ventilated grip three years ago, largely because it is unique and not something you see very often on a fly rod. What I've discovered is the ventilated grip has several benefits; most importantly because of the gaps in the grip, I don't tend to squeeze the rod quite as tightly and have more accurate and comfortable cast. In the rods I've built since, I've changed and refined my process to the point where I'm happy to share. Just like anything else when making fly rods, there are many ways to get to the same finish, this is just the way that works best for me.

One of the most overlooked parts of making a nice looking grip is cork selection. We all want to put the best cork possible on our rods, for years I bought the most expensive cork, sorted out the rings with the worst flaws and glued up the grip. Earlier this year I designed a cork grading jig to help grade the rings and see where the flaws are in relation to the distance from the center of the ring.



1. **Designing your grip** is important, especially when using the grading tool, so that you can plan the final diameter of each ring of the grip. I do a lot of cork reel seats as well and usually glue and

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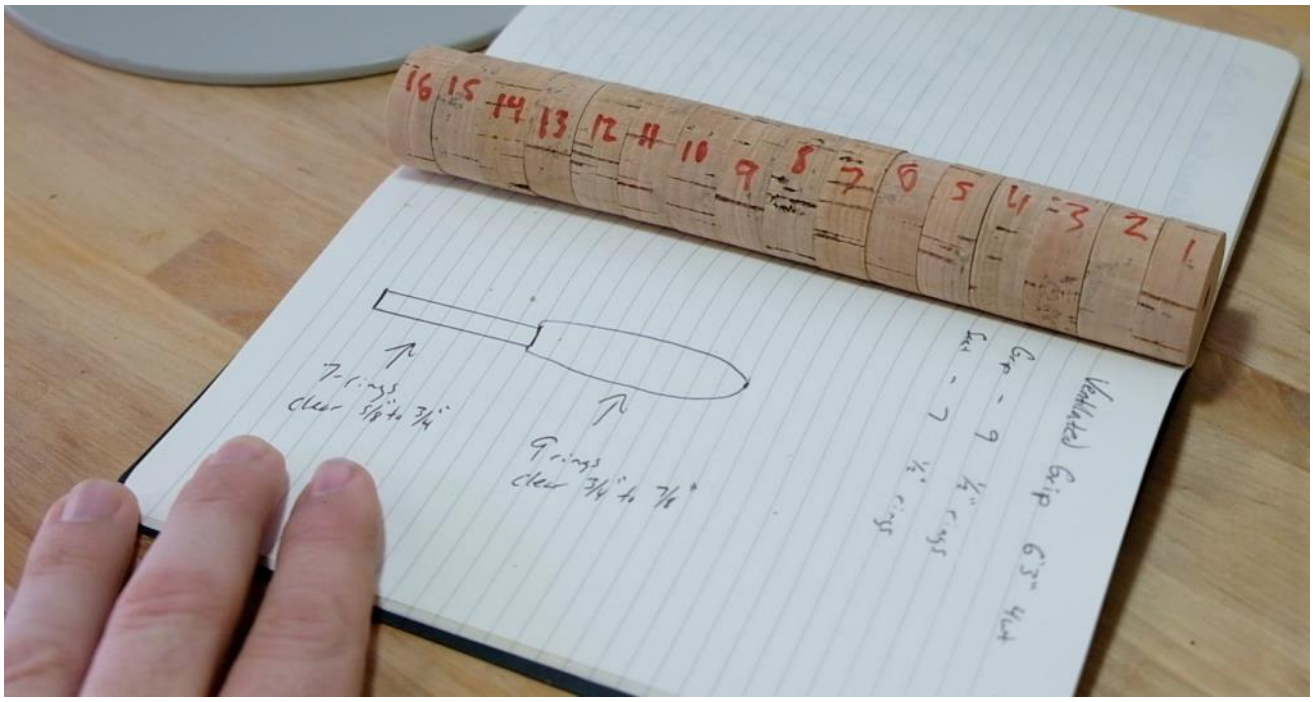
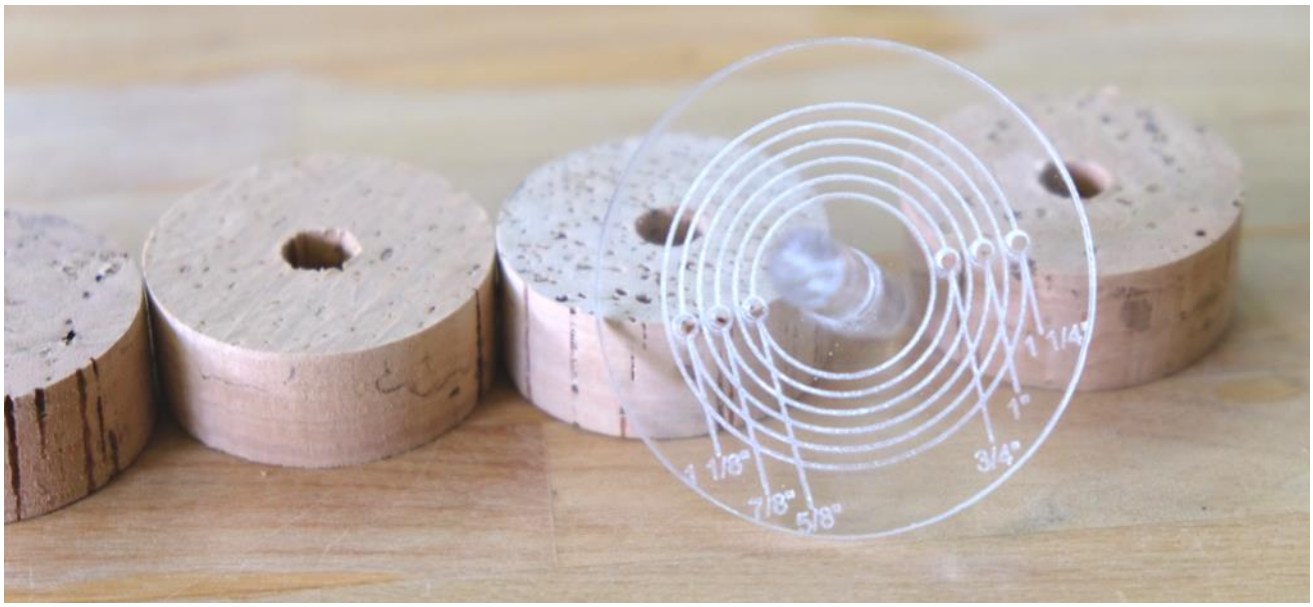
turn everything at one time. It might be helpful to assign each ring of the design a number and record the final diameter so when you choose cork you can pick the best piece for the given diameter.





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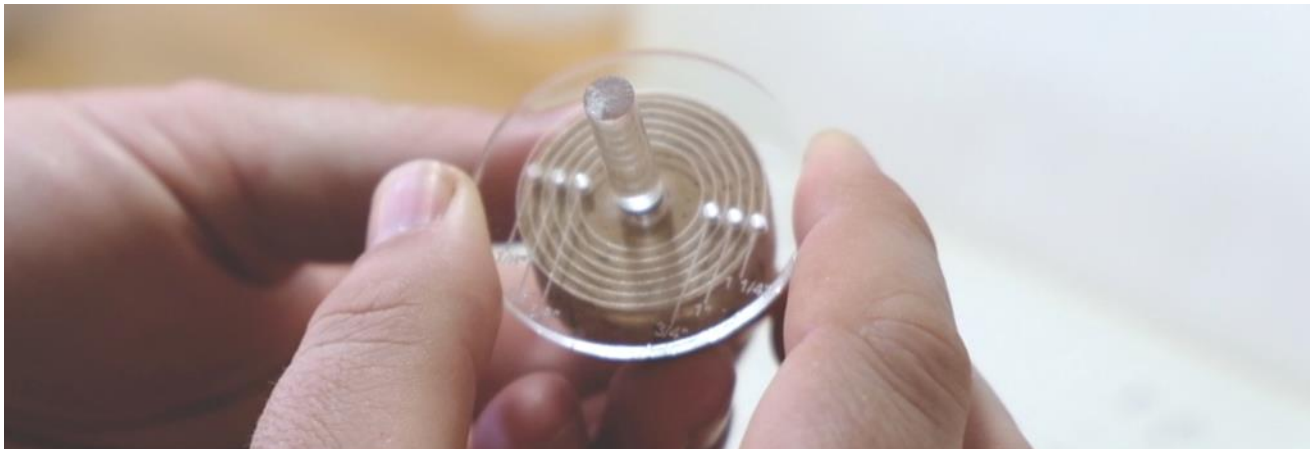
2. **Choosing cork** using the cork grading jig is what can make your rod grip stand out even if you don't have the cleanest cork to work with. Slide the ring onto the jig and check the diameter for your first ring. If the cork is clear **on both sides** go ahead and mark the outside with the position number. **Tip:** Choose the cleanest cork face to be on the leading end of the grip.



(Continued on page 24)

3. **Ream** out each ring and test its fit on the rod blank. I use a rat-tail file and do this outside on the porch since it makes a bit of a mess.

4. **Mix up your epoxy** and start gluing the rings on one at a time. I use Rod Dancer two part epoxy that sets in a couple hours. The grip will be ready to turn the next day. Glues and adhesives are debatable but I feel in this case epoxy is the best for the job. If I'm gluing a regular grip I use Titebond III so that you don't have hard glue joints between the rings.

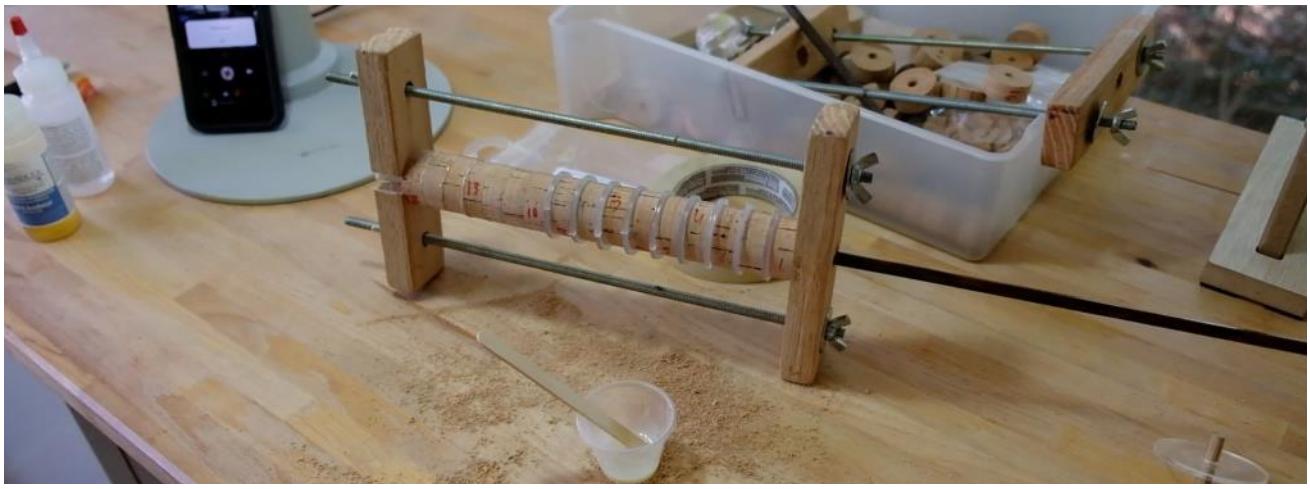
(Continued on page 25)

5. **On the ventilated section** of the grip, you still want to make sure you use plenty of glue. I will put the glue all the way around the blank just above the final position for the ring. After I slide the ring into place I take a popsicle stick and paper towel to clean out the excess epoxy before I slide in the spacer.

6. **Between each ring** on the ventilated section of the grip I use a polypropylene washer that is cut in half. I bought the washers pictured above from McMaster Carr, but you might find something that will work in your local hardware store. The washers need to have a large enough center hole to not touch the blank and a large enough outside diameter to be easily removed after the glue has set. Thickness is personal preference, I've seen ventilated grips that were made with smaller and larger gaps. There are certainly other ways to space out your rings and I have used coins in some of my earlier rods, the washer seems to be pretty effective and easier to work with.

(Continued on page 26)

7. **Clamp the grip** tight enough to keep everything from moving around. If you're doing a cork reel seat as well, like I show in the pictures you'll need to clamp tight enough to keep the cork rings on the seat section touching. My cork clamps are simple and made out of 1"x2" pine, ¼" threaded rod, washers, and wingnuts. I allow a full 24 hours for the epoxy to fully cure.



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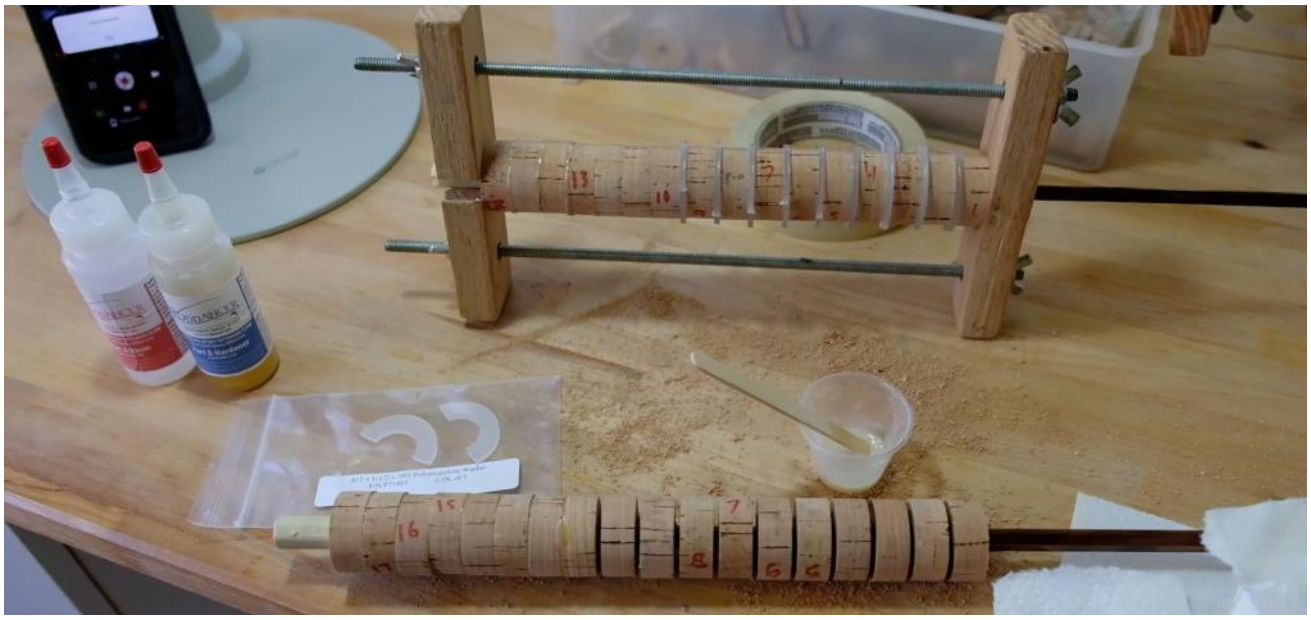
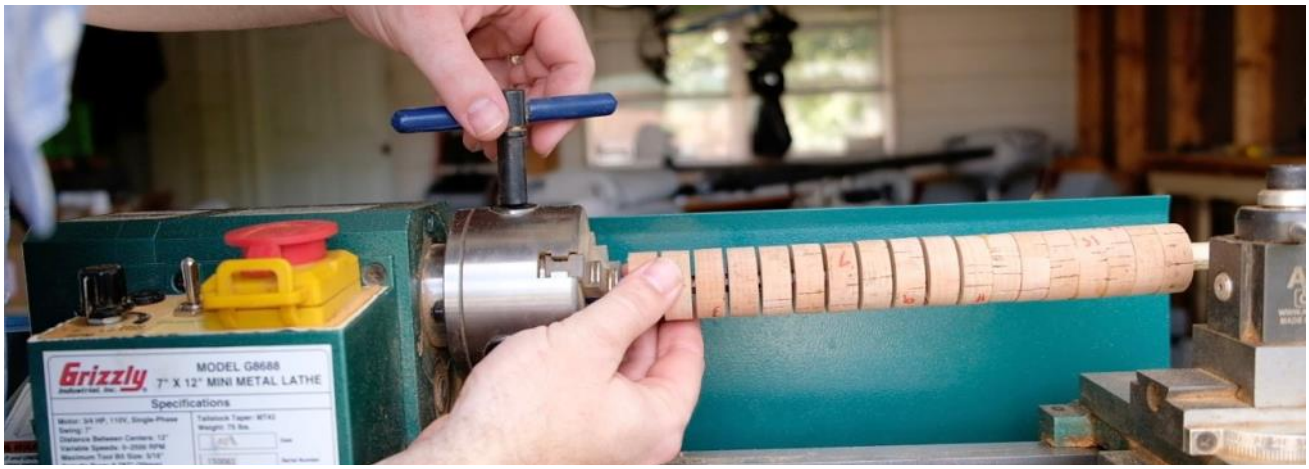
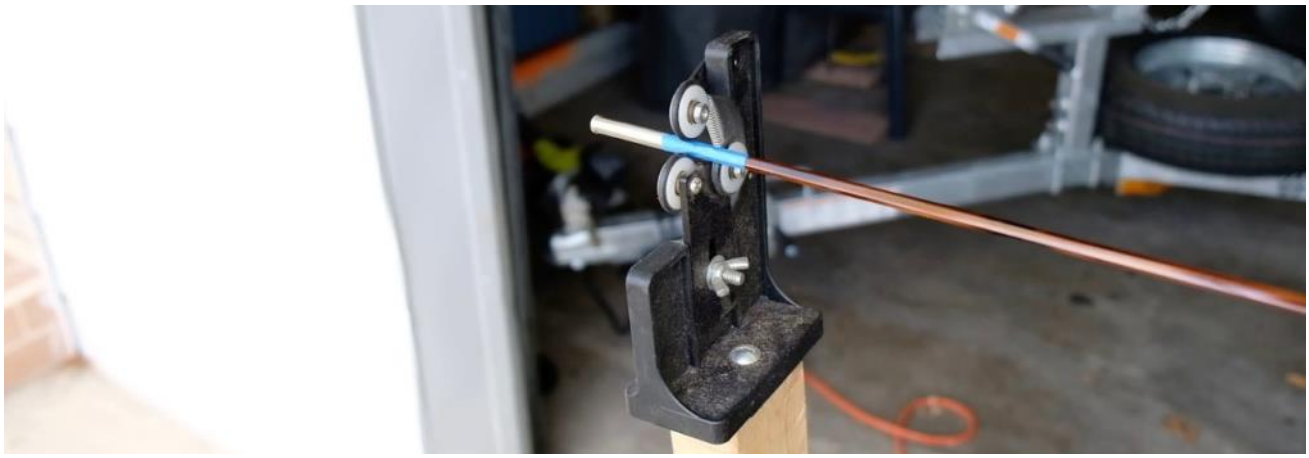


8. **Tape the blank** before securing it in the lathe. I put several wraps of painters tape just above the top of the grip, a long piece to cover the entire section of the blank that is in the headstock, and a wrap near the ferrule where the blank will be secured for turning. **Tip:** Make sure your wraps of tape are going in the same direction that the blank will turn in the lathe so if the edge starts to peel the turning lathe will not ruin your blank.

(Continued on page 28)



9. **To secure the blank** in the lathe I secure the section just above the grip in the chuck, support the end below the reel seat with a steady rest with a cork ring mounted in the rest, and steady the outboard section of the rod. I use a rod wrapping stand clamped to a stool to keep the end of the rod secured.



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10. **Shaping the grip** is pretty straightforward. I use a progression of drywall mesh, then 60, 100, 400, and 1000 grit sandpaper. All of the actual shaping to dimension happens with the mesh, 60, and 100 grit. Take your time and go slow to make sure you hit your numbers from the design you sketched out.

One thing to keep in mind when building a ventilated grip is how the exposed rod blank will be finished in between the cork rings. I finish my blanks with 10-15 coats of TruOil before I glue the cork rings so the blank is finished in the exposed areas.

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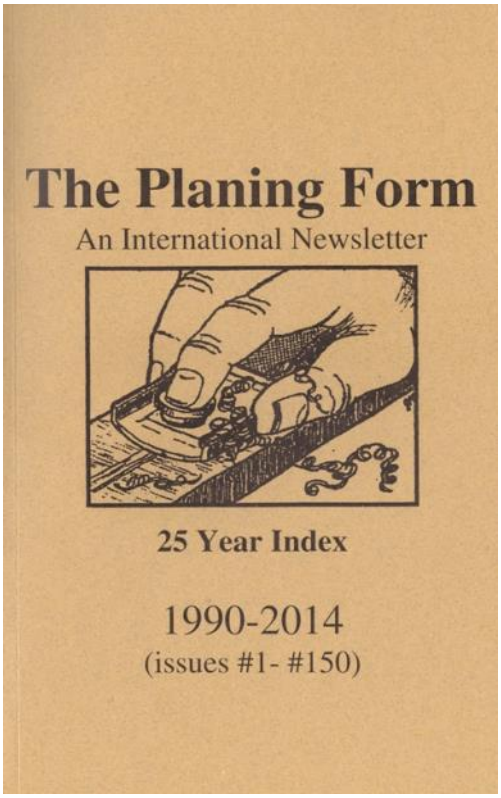

European Tapers

Text and photos from Wolfram Schott

Ron Barch, of "The Planing Form", suggested compiling some European rod tapers, for the "collectors" among the rod makers, and some general information about them. I have selected, from my archive, a number of tapers from major European makers, and my friend Johan Nygaardsvold, from Skorovatn, Norway has contributed with some Hørgård measurements.

I have selected 24 single handed trout rods and 25 two handed rods (salmon rods). Hundreds of trout rod tapers have been published, both in print and in a number of internet sources, and most every rod maker has tweaked some tapers a bit to suit his fancy, and created new tapers/rods. But only a few such specifications for salmon rods have been published. Maybe the tapers below inspire some rod makers to try a hand on these?

The calibrations are measured in millimeters, and the imperial values in decimal fractions of an inch are calculated. Accordingly, the graphs use millimeters on the axis for Rod Diameter. The guide distances are given in centimeters and inches. The salmon taper graphs include, for quick visual reference, a Garrison taper of an 8' 9" rod, model 221, Salmon Rod. In the trout taper graphs a Garrison 212 taper is included.

When building two handed salmon rods you enter a whole new dimension of rod making, with a number of challenges. The length of the rods requires quite thick diameters, and a steel planing form designed for trout rods will not always open far enough to accommodate the splices. Maybe the butt side does sometimes, for mids and tips, but a specially made planing form with a deep V is required. The tapers are often different, too. Since you cannot accelerate the line by single- or double-hauling utilizing your non-casting hand, the rod has to do all the work. You want it to work over its whole length, and down into the handle, which is usually from 22-28 inches long, depending on rod length. Your hands have to be placed well apart, for good leverage. Swelled butts prevent the rods largely from bending into the handle, and the rod's full potential is not employed. Ferrules of the required sizes present another problem. As they are usually not readily available you have to make them yourself. You need from 30/64th upwards for the lower ones, and from 20/64th for the upper, with three piece rods (the 15' HLL rod in the tables below has 30/64th and 19/64th, for example, and the 18' HLL rod 40/64th and 26/64th; and these are rather slim rods. The 40/64th ferrule is 8.34 in. long, sections joined). Two piece rods can be, and have been, made. But the length of the sections may present problems, both when planing the strips, and transporting the rod.

The often used term spey rod for two handed rods at large is somewhat misleading. The rivers Spey, Tay, Dee, and Tweed, comprise the big four in Scotland. The banks of the Spey are mostly high, with lots of vegetation. Anglers had to invent and apply water (roll-) casts to present their fly to the fish. These special casts, developed along the river and usually using long rods (13 – 18 feet), are termed Spey Casts. There is a Single Spey and a Double Spey, used, dependent on the wind direction (upstream or downstream), from either side of the river. The Spey Cast as such has nothing to do with rod length. You can perform it with a 7' rod, if you fancy. But this is not the point. With a long rod of suitable taper you can reach out much farther (the old masters used 18' - 20' poles, and beyond[1]). Today 14' - 16' is the most used length, with 13' as a minimum. Indeed, for the ordinary Spey Cast, *length* is a more important factor in a rod than *strength.* You cannot lift a long line with a short rod; and what a Spey Rod lifts it will also cast.

Some of the earliest and perhaps most famous, true Spey Rods were built by Alexander Grant, of

(Continued on page 32)

Carrbridge, Inverness-shire, Scotland. He was the inventor of "The Grant Vibration Rod", made of Greenheart [*Chlorocardium rodiei* (R.Schomb.) syn.: *Ocotea rodiei*, *Nectandra rodiei*]. Each section was joined to the other by overlapping swelled splices designed with a turned up end that reduces the amount of vibration usually associated with this type of rod, and held in place by leather thonging, which also could not slip over these turned up ends. Making the rods, he planed away the wood until, upon being struck with a tuning fork, it gave the correct note, or tone. Hence the name. A patent for this fishing rod was applied for in 1894 and granted. On December 11th, 1896, he demonstrated his invention to the angling press of the day at Kingston-Upon-Thames, spey casting 56 yards with a 20-foot rod, standing on the bank 15 inches above river level. The distance was measured from his feet to the fly.

In 1900, Grant, who was making his rods single-handed, could no longer cope with the demand and sold the patent to Charles Playfair & Co. Gunmakers and Fishing Tackle Manufacturers, of Aberdeen, who produced the rods until their closing down in 1955, after 134 years in business. Today they are again available. Clan Fishing Rods, Ltd., Strathspey, Inverness-shire, Scotland, makes them in 13' to 17' lengths (and in Greenheart!).

I have included one (Playfair) "Grant Vibration" taper, of 13'2". Now, comparing Greenheart and Split Cane is somewhat like comparing apples and pears: round and solid versus hexagonal, and two different materials as well. But you get an idea of what the whole thing is about in terms of general taper.

Eventually more rods were built by various manufacturers especially for this casting style, with usually rather thin calibrations in the lower third or so, and heavy, powerful top joints. Some had even reverse tapers into (under) the handle. Remember: with two-handed rods you cannot apply a double-haul. The rod has to do all the work. And every bit of it is used to do it, much like in parabolic rods.

In the taper tables, I have included guide spacings for the trout rods, but omitted them (and other details, like number and position of intermediate windings, ferrule sizes, handle length, thread color) with salmon rod tapers. Should someone be interested in these details, please contact me. For a few rods two or more individual tapers are given in the tables to show the variation within a certain model. As with all machine made production rods, some, and often large tolerances have to be considered, and sometimes the taper was also subject to intended changes.

Hardy Bros.

In 1998 "The Flyfisher's Classic Library", England, published a book by James Leighton Hardy: "The House the Hardy Brothers built". On pages 276-295 (Appendix B) the author lists all the rods (397 models) the company had built between 1883 and 1983, and the manufacturing data. From Lancewood and Hickory to Greenheart to Split Bamboo to Glass Fiber and Carbon Fiber. 222 different Split Bamboo rod models are listed, including spinning and coarse fishing rods. Mostly hexagonal rods, but also octagonal and nonagonal ones, both single built, double built and steel-centered. The list is not complete, as some models mentioned in the list were produced in still other lengths, and since 1983 more models have been added.

Many of the rods were made over a very long period of time. The Gold Medal, (8'6" to 20') e.g. was produced from 1883 to 1967, the Hi-Reagan Salmon, (15' and 16'), from 1891 to 1952, the Houghton Dry Fly, (9'6", 10', 10'3", 10'6" 11') from 1894 to 1957. Others had a rather short life: The Baden Powell (11') was made in 1903 only, the LRH Wet (9'3") from 1948-1950, the Reservoir Fly (9'6") from 1967-1970.

(Continued on page 33)

Most of the models were made in a number of different lengths. For example the Phantom was made, from 1962-1972, in 4'4", 6', 6'10", 8', 8'6", 9', 10' in 2-piece configurations, and in 8', 8'6" and 9' in 3-piece configurations.

This means in truth 10 different rods with as many different tapers! Moreover, many of the rod tapers were altered to some, sometimes great, degree in the course of years, and the make-up of some rods as well, e.g. the color of the guide windings, the type, number and spacing of guides, and with some rods the intermediates were eventually omitted. Several Hardy rods of the same model and length were made in different weights, too. E.g. the Koh-i-noor, of 8' 9", was available in 5 oz (Nr. 1) and 5 ¼ oz (Nr. 2), and, additionally, steel centered by special order. Also the J.J. Hardy Triumph, of 8' 9" could be had in a 4 ¾ oz and a 5 ¼ oz version, and both as two or three piece rods.

So, a taper of a particular rod (model, length, number of sections, weight, and year) is often just that.

By the way: the trade name Palakona and the Reg. No. 246963, written on the rods, have nothing to do with either model name or rod number. The name is derived from pale cane and was registered in 1902. But there WAS a Palakona model, made from 1973-1978, in lengths from 6' to 8'9", and in 2 pc/1 tip configuration.

Some of the more popular models, like the Palakona, were reintroduced in the 1980-ies and 90-ies, in a number of lengths; also the Marvel, Phantom, C.C. de France, Continental Special, and others. It is virtually impossible to obtain/collect the tapers of all of these rods. Below are listed some of those I have handled or repaired/refinished, and measured. When rods had two tips, both were measured and the average values are given.

I have selected a few rather long trout rods, and some salmon rods. Note the quite sharp drop-over-ferrules with most rods. Hardy's were using their own ferrules, a step-down type (no super-Z).

Pezon et Michel

Pezon et Michel was another major European producer of split bamboo rods. In 1937 a mutual friendship between the chief-designer Edouard Plantet and Charles Ritz resulted in the development of the most famous Pezon rod series: the Super Parabolic PPP (Puissance Pendulaire Progressive, Progressive Pendular Power, also called Perfect Progressive Power). It was launched in 1949 with six models. Later others were added, many named after fishing friends, e.g. Al McClane, Mario Riccardi, Pierre Creusevaut, Hans Gebetsroither, and others. In 1958 Ritz founded the famous Fario Club, which held its annual meeting at the Ritz Hotel in Paris. One of the PPP-rods is named after this club, and bears his name. They PPP rods were "...the end product of the most advanced scientific research in the field of fly rod action. They enable the angler to master easily the HS/HL (High Speed/High Line) casting technique." (from a Pezon et Michel catalogue).

A few of the shorter PPP rods are listed below. In addition a competition rod (130 grams = 4.58 oz allowed weight), extremely staggered, with a diminutive handle and reel seat and a very short (light) ferrule, and two salmon fly rods.

Asbjørn Hørgård A/S

Much has been published about both Hardy and Pezon & Michel, but very little about Hørgård. So let me detail somewhat on this Norwegian company.

(Continued on page 34)

Asbjørn Hørgård started rod making in 1934, with bamboo ski-poles as raw material. In 1938 he went to England, to study split cane making in its homeland. Back again in Norway he constructed a number of machines, for rough- and taper milling, gluing, and others, using bicycle-wheels amongst others. World War II and German occupation of Norway stopped all business. His premises were confiscated and he was imprisoned by the Gestapo. In prison he made drawings of things he intended to do and produce after the war, with a pencil and on toilet paper, which was the only available paper. These included the exact layout of the workshop of the company, detailed construction plans of fishing reels, both fly and multiplier, reel holders, folding-net mechanisms, and others. In all he had 162 sheets of toilet paper hidden on his chest under his clothing, when he was freed May 8th, 1945.

After WW II, Asbjørn Hørgård A/S soon became the major producer of fishing tackle in Norway. The company grew quickly from a one-man-operation to a large firm. 800 m2 (8,610 sq. ft.) shop area in 1947 eventually became too small, and the company had to move to the outskirts of Trondheim in 1973, where a new building was erected, 3200 m2 (34 445 sq. ft.) in size. Their total production was over 130 000 bamboo rods, mostly fly rods and a number of spinning/coarse fishing rods; in two and three sections, solid and hollow, single and double built and even triple built rods for tuna fishing. In 1985 bamboo rod production came to an end. Blanks and components were available for another year or two, from surplus stocks. Today the company does not exist any more. But thousands of these rods are still fished, and treasured, in Scandinavia and elsewhere. The machines Asbjørn Hørgård had constructed are displayed in museums today.

The majority of the trout rods are rather long, from 9' to 9' 6". True no-nonsense fishing tools, and suited for Scandinavian waters. Most rods were available with either one or two tips, and with different types of reel seats (screw-lock or sliding band), and some of the longer ones could be ordered with a detachable fighting butt. Spare tips for most rods could also be ordered from catalogues.

Possibly the best known rods are the Konkurranse (= competition) models. As the name suggests, they were designed for Tournament casting (skish, distance). But anglers soon found out that they were perfectly suited for grilse and sea trout fishing. Arguably more sea trout have been caught with these than with any other rod, although Hørgård, in a catalogue from 1956, remarks that "...the Konkurranse F is so powerful that it is not recommended as a fishing rod." The Konkurranse B and D, especially, were much used for sea trout dry fly fishing in the famous rivers "Lærdal" and "Aurland".

The "Lillemor" was another very popular model, and a "...most delicate rod for light trout fishing ... distinct tip action for perfect dry fly presentation." Economy rods with cheaper hardware included models like "Golden Fly", "Silver Fly" and "Veslemøy".

Some of Hørgård's rod models were marketed in the US by Norm Thompson (e.g. model K-821, one tip, K-822, two tips, 8 foot two piece for a # 8 line), in Sweden by Leidesdorf, in Germany by Balzer, and others.

Norway has a coastline of 25,000 km (≈ 15 500 miles), 455,000 lakes, and countless rivers. 1,121 of these are officially registered (per 1995) as to have migratory fish (salmon, sea trout, sea char), and 629 of these have salmon runs. So, naturally, salmon rods have always played an important role in the arsenal of a Norwegian angler, and many a salmon has been caught with Hørgård rods. Asbjørn, a keen angler himself, knew what the game required, and designed the rods accordingly.

The biggest and most powerful series, the "Namsen", was also suited for harling from a boat, and

(Continued on page 35)

either fly, spoon or wobbler could be used with it. The 15' 6" rod weighs 1000 grams (35.3 oz) and a DT-line of 40 yards and 105 grams (3.7 oz) was recommended (= DT 12). A very powerful rod indeed. I have included a still longer 15' 10" version of the "Namsen" in the tapers below. The "Orkla", of 14' 6", was another choice for many of the larger salmon rivers, where long casts are required and heavy fish expected.

Hørgård rod models listed in catalogues from ca. 1950 to 1985:

Note: Many of the rods are named after Norwegian rivers.

Single Handed Trout Fly Rods	Double Handed Salmon Fly Rods	Spinning/Coarse Fishing Rods
Aura, 9'0"	Alta, 14' 0"	Caster, 5'3"
Bua, 9'0"	Etna, 14' 0" (2 pc., butt cane, tip glass)	Driva, 12'6"
Distanse, 9'6"	Fellow, 12'6"	Esox III, 7'
Ena, 9'0", 9'6"	H. A., 12'9"	Etna Surf, 12'6" (butt cane, tip glass)
Flua, 9'0"	H. B., 12'9"	Ferder, 9'3"
Golden Fly, 8'0", 8'6", 9'0", 9'6"	H. C., 12'	Glomma, 6'6" (1 pc)
Junior, 7'6"	H. D., 11'	Gula, 11'
Konkurranse B, 9'3"	Namsen, 14'6", 15'0", 15'6"	H 4, 5'6"
Konkurranse D, 9'0"	Orkla, 14'6"	Lillemor Flue-Spinn D'Luxe, 8'6"
Konkurranse E, 8'6"	Skauga, 13'6"	Lista, 9'3"
Konkurranse ED, 8'6"	Sona, 13'6"	Model 21, 10'3"
Konkurranse F, 9'6"	Splittfly, 14' 0" (2 pc)	Sjoa, 5'6"
Konkurranse Type 27, 9'6"	Tana, 13'6"	Skreppa, 6'
Lågen, 10'6"		Spinn, 9'3"
Light Fly, 9'0"		Spinnglass, 9'6" (butt cane, tip glass)
Lillemor, 8'6"		Spinning, 9'3"
Mount Royal, 8'8"		Splitcast, 5'6"
Nea, 9'0"		Splitttglass, 9'3" (butt cane, tip glass)
Nidelv, 9'0"		Steel-Cane A, 5' (1 pc)
Prince, 9'3"		Steel-Cane B, 5' (1 pc)
Silver Fly, 9'0"		Surna, 10'
Special, 9'6"		Terna, 8'
Turist, 8'0" (4 Piece)		Threadline 1/0, 7'6"
Tya, 9'6"		Threadline 1A, 6'9"
Type B, 8'6"		Threadline 1B, 6'9"
Vesla, 6'6", 7'0", 7'6", 8'0"		Threadline 2/0, 7'
Veslemøy, 8'6"		Threadline 2A, 6'9"
		Threadline 2B, 6'9"
"Olympicane" -set, containing a 3 pc/2 top rod, 3 ½ " reel, 20 yd line, 2 pc. "Stone Fly" imitations, illustrated instruction booklet about fly casting		Threadline Junior, 5'6" (1 pc)
		Ula, 6'
		Warlock, 10'3"

(Continued on page 36)

And just to mention it, in passing: another important Norwegian fishing tackle company was Vangen & Calsen. Sigurd Vangen began rod making in the 1930s. After WW II, with demand rising, he started a company together with his friend and fishing-buddy Odd Carlsen. The ingenious Sigurd developed a famous hollow-building process, called "Magic Star", and held several patents for fishing tackle. Both Hardy's and Orvis were interested e.g. in his expanding male ferrule, called "Intercon", but he would not sell the patent. In 1970 the company produced 3000 rods. A growing market for the new materials, glass- and carbon-fiber, eventually put an end to bamboo rod making. Sigurd Vangen died in 1988, and today the company does not exist any more.

Other Salmon Rods

Sharpe's, of Aberdeen was founded by J. S. Sharpe in 1920. The company quickly established a reputation for quality and excellence in the design and manufacture of impregnated split cane rods for salmon and trout fishing. They introduced many of the American rod building techniques to the British market, particularly the process of impregnating split cane (c.f. U.S. Patent No. 2,532,814, Dec. 5, 1950, Wesley D. Jordan to Charles F. Orvis Co., Inc.) and they quickly and deservedly built up a worldwide reputation for fine fly rods. Their salmon rods, spliced or ferruled and impregnated, are some of the best spey rods ever made, anywhere. The most popular lengths were from 12 to 15 feet. Included in the tables are the tapers of a 12 footer and a 13 footer.

Included, too, are a few salmon rods of US origin, for comparison. An H.L. Leonard 15-footer from around the turn of the last century, from the period 1881-1908. The lighter version (23-25 oz) of two available; the heavier version was 27-29 oz. Furthermore a powerful HLL 16-footer from the same period, of 1.14 kg = 40 oz and a HLL 18-footer, from around 1900. Also listed is a Payne salmon rod, model 233, of 11' 6". All of these are no spey rods, but rather soft/smooth overhead casters with a swelled butt and a mid-to-tip-action. I have fished the 15 and 16 foot rods. The 18 foot rod I have lawn-cast only: you need to take a good stance, or tuck your feet under some boulders to keep your balance…

In the tables and graphs below I have grouped the various models. First two sets of Hardy trout tapers, all much stouter than the "Garrison 212", which is added for comparison. The "Houghton", of 1925 vintage, has a quite unusual taper and sports a total of 432 intermediate windings: butt 47, mid 77, tops 154 each. A slow rod. The Pezon & Michel PPP tapers are true parabolics, save the smallest, "McClane Wading", which is a remarkable fast rod. The "Concourse Distance" needs a strong wrist, but will cast a # 8 or 9 line a country mile. The Hørgård tapers represent quite the opposite genre: fast and powerful dry fly tapers (the Konkurranse ED e.g. is a close cousin to a LL Dickerson 8015 GS, though 6" longer and hollow built, and approximately a "A 9x1/7" in the E. C. Powell Taper System).

I have lawn-cast the rods, and fished some. But I shall not discuss the advantages and merits of one over the other here. All of these rods have been produced by the thousands, and fished, and admired, and loved. Degustibus non est disputandum.

The salmon rod tapers are also grouped:

Fig. 5: Three tapers of a "LRH Salmon Fly". A typical all-round rod, well suited for heavy waters and long overhead casts, which also will roll-cast a heavy line. No real spey-caster, though. Observe the different tapers: The steel centered (1956) one is much thinner in its butt calibrations.

Fig. 6: A bunch of "Wye" tapers, also all-round rods. Note the different tapers. The oldest one

(Continued on page 37)

(1956) is entirely different from the others. The No. 70133 is a "dark coloured" rod, stained with potassium permanganate (see Fig. 15).

Fig. 7: Some spey rods proper: The "Mother of Spey Rods", a Playfair "Grant Vibration" (Greenheart) and two "LRH Spey Casting", both steel centered and without. The "LRH Greased Line" and the "AHE Wood" will also spey, or switch cast, but only short line lengths. They are not as strong as the above rods and were rather designed for light line overhead casting (lines 7 – 9, depending on length of line outside top guide. With two handed salmon rods you have a lot more than 10 yards of line busy, which are the basis for AFTM-rating; both spey casting or overhead).

Fig. 8: Two other wonderful spey rods, a Sharpe's spliced, of 12', and one of 13'. The 13' to 15' models are the more used lengths. Also pictured, for comparison, both a "LRH Spey Casting" and the "Grant Vibration". Here I have included the two quite severe swells over the splices (jointed). They have to be so thick to bear the shear forces and a lot of torque as well. The Sharpe's rods have similar swells over the splices.

Fig. 9: Two Pezon & Michel salmon rod tapers. Parabolic, yes, and they will spey cast, although lacking a bit power in the mid and top calibrations.

Fig. 10: The tapers of two massive Hørgård rods. Overhead casters, and some of the most powerful ones you are likely to find in their lengths. Included a "LRH Spey Casting" and a "LRH Greased Line", to compare. Tapers of other Hørgård salmon rods have been published in "Power Fibers", January 2001.

Fig. 11: Three HLL Salmon rods, plus a "wee" Payne. Rather slim rods, compared to the above Hørgård rods, and also compared to the "LRH Salmon Fly". The 18-footer is not easy to handle for the "tyro", due to its sheer length, its weight of 42 oz (1.19 kg), and the rather short handle of 26 in. (HLL two handed rods from 14 to 18 feet had handles from 22 to 26 in.). Again, a "LRH Spey Casting", of 13' 9", for comparison.

Fig. 12: Here I have gathered some selected tapers to show the principal difference of spey rods versus overhead casters. Two typical spey rods, (LRH Spey Casting, 13' 9" and Sharpe's Spliced, 12'), and two overhead casters of different characters (Orkla, 14' 6", HLL, 15').

The X-axis (Rod Diameter) is given in inches, for once.

The Garrison 221, shown for quick reference in all graphs, or other single handed rods for that matter, may be used for salmon fishing, of course. But I would much rather have a two-handed, say 14-footer, when playing 20 pound fish in a large river. The leverage of a long rod alone is a great advantage. In Europe we usually associate two-handers when talking of salmon rods, be it split cane or carbon fiber.

(Continued on page 38)

Trout Fly Rod Tapers

Table 1

Hardy Continental Special staggered 8' 4" # 6 without varnish No. K/G 1984			Hardy Koh-i-Noor 8' 9" # 7 without varnish post numbered 1			p.n. 2		Hardy LRH Dry Fly 8' 9" # 7 without varnish No. H 15763 1958			No. H 67403 1965		Hardy Perfection 8' 6" # 5 without varnish No. H 61124 1964		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
0	2.16	0.085	0	2.16	0.085	2.36	0.093	0	2.30	0.091	2.04	0.08	0	2.13	0.084
5	2.43	0.096	5	2.58	0.102	2.74	0.108	5	2.78	0.109	2.46	0.097	5	2.63	0.104
10	2.80	0.11	10	3.04	0.12	3.24	0.128	10	3.34	0.131	2.92	0.115	10	3.18	0.125
15	3.25	0.128	15	3.60	0.142	3.82	0.15	15	3.68	0.145	3.36	0.132	15	3.61	0.142
20	3.72	0.146	20	4.22	0.166	4.34	0.171	20	4.00	0.157	3.68	0.145	20	3.87	0.152
25	4.12	0.162	25	4.50	0.177	4.70	0.185	25	4.25	0.167	4.06	0.16	25	4.12	0.162
30	4.48	0.176	30	4.80	0.189	4.94	0.194	30	4.56	0.18	4.26	0.168	30	4.40	0.173
35	4.78	0.188	35	5.12	0.202	5.28	0.208	33	4.74	0.187	4.30	0.169	35	4.76	0.187
40	5.25	0.207	40	5.50	0.217	5.58	0.22						40	5.11	0.201
45	5.50	0.217	45	6.00	0.236	6.04	0.238	37	5.55	0.219	5.26	0.207	45	5.36	0.211
50	5.58	0.22	50	6.24	0.246	6.18	0.243	40	5.73	0.226	5.37	0.211	47	5.56	0.219
53	5.71	0.225						45	5.96	0.235	5.64	0.222	51	5.93	0.233
			55	7.00	0.276	7.02	0.276	50	6.13	0.241	5.92	0.233			.
57	6.40	0.252	60	7.18	0.283	7.28	0.287	55	6.40	0.252	6.06	0.239	55	6.22	0.245
60	6.48	0.255	65	7.45	0.293	7.56	0.298	60	6.64	0.261	6.46	0.254	60	6.54	0.257
65	6.74	0.265	70	7.80	0.307	7.88	0.31	65	6.87	0.27	6.68	0.263	65	6.77	0.267
70	6.93	0.273	75	8.14	0.32	8.30	0.327	68	7.03	0.277	7.07	0.278	70	7.11	0.28
75	7.15	0.281	80	8.35	0.329	8.56	0.337						75	7.39	0.291
80	7.35	0.289	85	8.68	0.342	8.84	0.348	73	7.78	0.306	7.37	0.29	80	7.66	0.302
85	7.55	0.297	90	8.80	0.346	9.12	0.359	75	7.84	0.309	7.45	0.293	84	7.95	0.313
90	7.74	0.305	85	9.06	0.357	9.34	0.368	80	8.18	0.322	7.92	0.312	85	8.05	0.317
95	7.96	0.313	100	9.20	0.362	9.52	0.375	85	8.46	0.333	8.41	0.331	89	8.38	0.33
100	8.10	0.319	105	9.30	0.366	9.62	0.379	90	8.88	50	8.94	0.352	95	8.50	0.335
								95	9.35	0.368	9.45	0.372	100	8.60	0.339
								100	9.50	0.374	9.81	0.386	102	8.60	0.339
Guides. from top			Guides. from top					Guides. from top					Guides. from top		
Nr.	cm	in	Nr.	cm	in	cm	in	Nr.	cm	in			Nr.	cm	in
0	0	0	0	0	0	0	0	0	0	0			0	12	4.7
1	14.4	5.7	1	12	4.7	9.0	3.5	1	11.5	4.5			1	23.4	9.2
2	32.5	12.8	2	24.0	9.4	21.5	8.5	2	27.5	10.8			2	40.2	15.8
3	51.5	20.3	3	37.5	14.8	35.5	14	3	46.5	18.3			3	61.8	24.3
4	70.0	27.6	4	54.5	21.5	52.5	20.7	4	73.0	28.7			4	83.5	32.9
5	88.7	34.9	5	73.5	28.9	71.5	28.1	5	98.0	38.6			5	100.4	39.5
6	107.4	42.3	6	95.0	37.4	92.5	36.4	6	126.3	49.7			6	136.8	53.9
7	127.5	50.2	7	119.0	46.9	117.0	46.1	7	160.0	63			7	163.6	64.4
8	148.0	58.3	8	144.0	56.7	148.5	58.5	8	193.5	76.2			8	196.0	77.2
9	167.7	66	9	171.5	67.5	188.0	74								
10	189.0	74.4	10	203.5	80.1										

(Continued on page 39)

Table 2

Hardy J.J.H. Triumph 8' 9" # 6 without varnish No. H 64046 1965			**Hardy Phantom** 9' # 6 without varnish p.n.			**Hardy Reservoir Fly** 9' 6" # 7 without varnish p.n.			**Hardy Taupo** 10' # 7 without varnish No. H 46177 1961			**Hardy Pope** 10' # 7 without varnish No. F/S 1967			**Hardy Houghton** 10' # 7 over varnish No. E 1672 1925		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
0	2.26	0.089	0	2.02	0.08	0	2.26	0.089	0	2.3	0.091	0	2.31	0.091	2	2.49	0.098
5	2.58	0.102	5	2.4	0.094	5	2.65	0.104	5	2.84	0.112	5	2.82	0.111	5	3.27	0.129
10	3.18	0.125	10	3.08	0.121	10	3.1	0.122	10	3.6	0.142	10	3.67	0.144	10	3.58	0.141
15	3.66	0.144	15	3.74	0.147	15	3.75	0.148	15	4.08	0.161	15	4.09	0.161	15	3.74	0.147
20	4.15	0.163	20	4.26	0.168	20	4.2	0.165	20	4.46	0.176	20	4.54	0.179	20	4.05	0.159
25	4.54	0.179	25	4.58	0.18	25	4.8	0.189	25	4.8	0.189	25	5.04	0.198	25	4.36	0.172
30	4.7	0.185	30	4.81	0.189	30	5.05	0.199	30	5.02	0.198	30	5.28	0.208	30	4.69	0.185
35	5.05	0.199	35	5.1	0.201	35	5.4	0.213	35	5.37	0.211	35	5.4	0.213	35	5.02	0.198
40	5.4	0.213	40	5.54	0.218	40	5.7	0.224	38	5.58	0.22	40	5.66	0.223	38	5.37	0.211
45	5.64	0.222	45	5.68	0.224	45	6.05	0.238				45	6.1	0.24			
50	5.88	0.231	50	5.73	0.226	50	6.45	0.254	45	5.78	0.228	50	6.47	0.255	42	6.11	0.241
						55	6.8	0.268	50	6.16	0.243	55	6.68	0.263	45	6.25	0.246
55	6.5	0.256	56	6.58	0.259				55	6.48	0.255	57	6.76	0.266	50	6.68	0.263
60	6.84	0.269	60	6.7	0.264	60	7.05	0.278	60	6.78	0.267				55	6.77	0.267
65	7.1	0.28	65	7.07	0.278	65	7.3	0.287	65	7.12	0.28	62	7.39	0.291	60	6.8	0.268
70	7.26	0.286	70	7.3	0.287	70	7.55	0.297	70	7.38	0.291	65	7.63	0.3	65	6.86	0.27
75	7.55	0.297	75	7.5	0.295	75	7.9	0.311	75	7.68	0.302	70	7.75	0.305	70	6.93	0.273
80	7.96	0.313	80	7.88	0.31	80	8.25	0.325	77	7.8	0.307	75	7.92	0.312	75	6.91	0.272
85	8.1	0.319	85	8.25	0.325	85	8.6	0.339				80	8.26	0.325	78	7.17	0.282
90	8.28	0.326	90	8.54	0.336	90	8.85	0.348	85	8.14	0.32	85	8.41	0.331			
95	8.8	0.346	95	8.84	0.348	95	9.1	0.358	90	8.72	0.343	90	8.71	0.343	83	8.53	0.336
100	9.03	0.356	100	9.03	0.356	100	9.35	0.368	95	9.24	0.364	95	9.01	0.355	85	8.65	0.341
105	9.12	0.359	105	9.14	0.36	105	9.45	0.372	100	9.8	0.386	100	9.2	0.362	90	8.81	0.347
			108	9.2	0.362	110	9.55	0.376	105	10.3	0.406	105	9.48	0.373	95	8.84	0.348
						114	9.65	0.38	110	10.6	0.417	110	9.48	0.373	100	9.01	0.355
									115	10.73	0.422	115	9.48	0.373	105	9.26	0.365
									115	10.73	0.422	115	9.48	0.373	105	9.26	0.365
															126	9.25	0.364
Guides, from top			Guides, from top			Guides, from top			Guides, from top			Guides, from top			Guides, from top		
Nr.	cm	in	Nr.	cm	in	Nr.	cm	in	Nr.	cm	in	Nr.	cm	in	Nr.	cm	in
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	10	3.9	1	13	5.1	1	12.2	4.8	1	9	3.5	1	9.3	3.7	1	12	4.72
2	24.5	9.6	2	27.5	10.8	2	26.2	10.3	2	21	8.3	2	24.5	9.6	2	26	10.2
3	41	16.1	3	44	17.3	3	45	17.7	3	38	15	3	44	17.3	3	43	16.9
4	60.5	23.8	4	63.5	25	4	67	26.4	4	60	23.6	4	66.5	26.2	4	63.3	24.9
5	85	33.5	5	85.5	33.7	5	92	36.2	5	84	33.1	5	96	37.8	5	87	34.3
6	112.5	44.3	6	115	45.3	6	122	48	6	110	43.3	6	126.5	49.8	6	110	43.3
7	142	55.9	7	153.5	60.4	7	159	62.6	7	134.5	53	7	161	63.4	7	135	53.1
8	170	66.9	8	195.5	77	8	204.5	80.5	8	159.5	62.8	8	193	76	8	160	63
9	202.5	79.7				9	188.5	74.2	9	188.5	74.2	9	232.2	91.4	9	186.5	73.4
									10	224	88.2				10	223	87.8

Note:

Some of the actions are described thus in the catalogues:

Koh-i-Noor: "Inclined stiff, strong for wet or dry fly".

LRH Dry Fly: "Inclined stiff for dry fly. An all-round rod. ... the result of exhaustive experiments on the part of Mr. L. R. Hardy, covering a long period of patient testing, comparison and adjustment".

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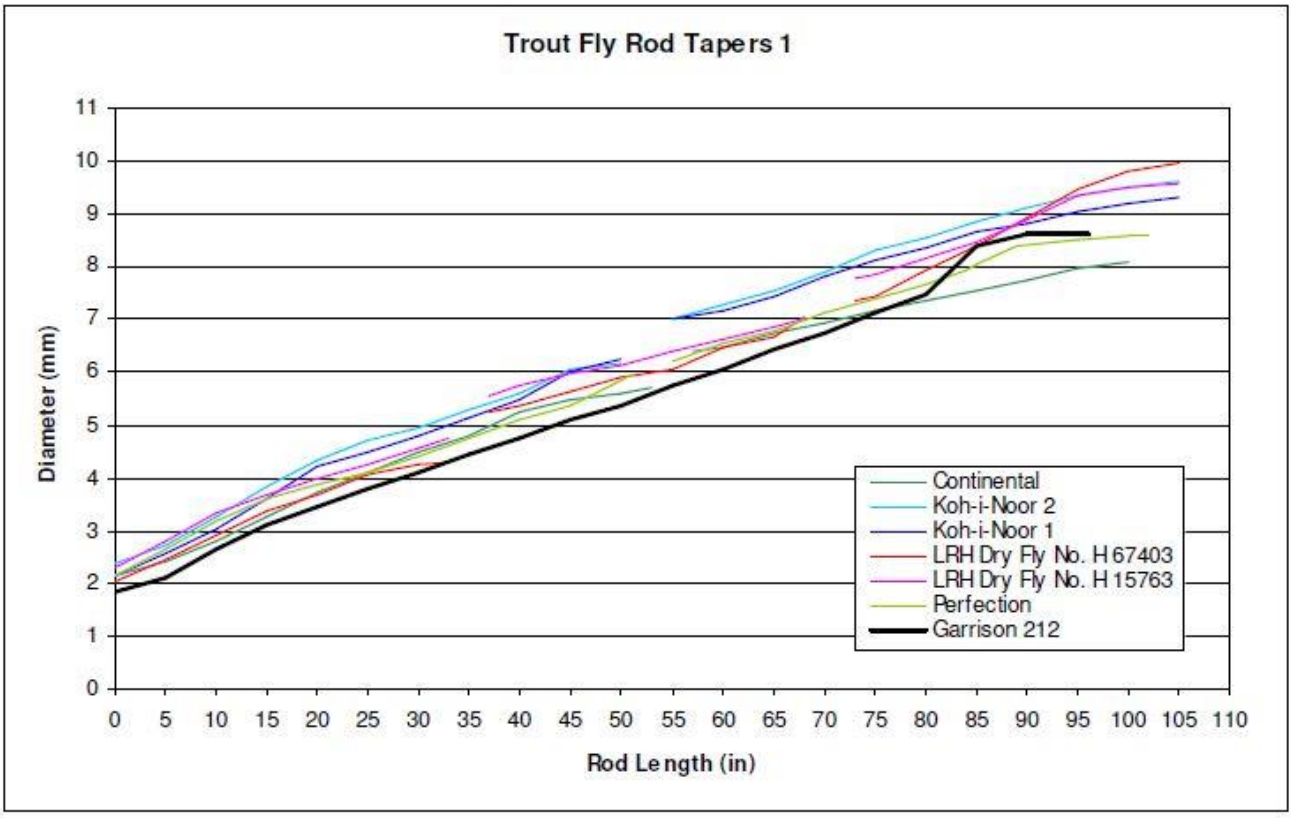
Perfection: "Medium for general all round fishing".

JJH Triumph: "Stiff, great power... of very pleasing balance".

Pope: "Stiff, for dry fly, a powerful rod".

Houghton: "Medium, a strong rod for dry fly. Although a perfect dry fly rod, it is most useful for loch and sea-trout fishing".

Figure 1



(Continued on page 41)

Figure 2

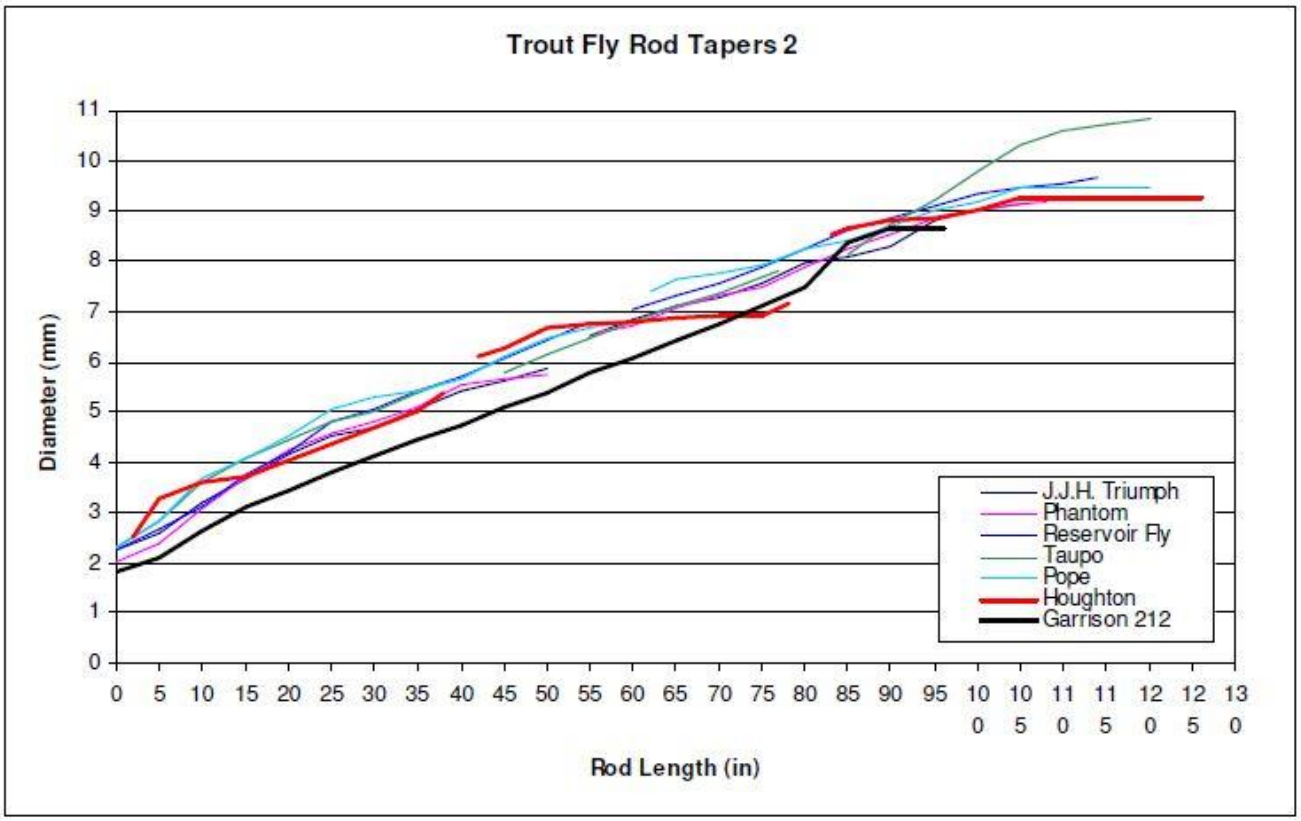


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Table 3

Pezon & Michel Ritz Super Parabolic PPP														Pezon & Michel Parabolic Concours		
McClane Wading			Super Marvel Type Hans					Master Type Lambiotte								
7' 1" # 5			7' 2" # 5					8' 3" # 5						Distance 130 g		
No. 98			3 3/8 oz. - No. 516614			3 7/8 oz. - No. 661		No. 1243			No. 501			8' 1" # 8		
not staggered			staggered 47/39"					staggered 53/46"						staggered 61/36"		
over varnish			without varnish			over varnish		over varnish			over varnish			over varnish		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Diam. (mm)	Diam. (in)		Length (in)	Diam. (mm)	Diam. (in)
1	1.8	0.071	1	2.18	0.086	2.45	0.096	1	2.18	0.086	2.28	0.09		1	2.45	**0.096**
5	2.24	0.088	5	2.57	0.101	2.82	0.111	5	2.56	0.101	2.47	0.097		5	2.7	0.106
10	2.6	0.102	10	3.04	0.12	3.2	0.126	10	2.93	0.115	2.9	0.114		10	3.14	0.124
15	2.97	0.117	15	3.52	0.139	3.53	0.139	15	3.35	0.132	3.31	0.13		15	3.51	0.138
20	3.3	0.13	20	3.9	0.154	3.92	0.154	20	3.76	0.148	3.66	0.144		20	4.04	0.159
25	3.83	0.151	25	4.2	0.165	4.42	0.174	25	4.1	0.161	4.06	0.16		25	4.48	0.176
30	4.2	0.165	30	4.71	0.185	4.8	0.189	30	4.51	0.178	4.48	0.176		30	4.84	0.191
35	4.59	0.181	35	4.84	0.191	5.16	0.203	35	4.7	0.185	4.78	0.188		35	5.31	0.209
40	4.94	0.194	40	5.33	0.21	5.55	0.219	40	5.31	0.209	5.21	0.205		40	5.92	0.233
45	5.47	0.215	45	5.6	0.22	5.8	0.228	45	5.71	0.225	5.48	0.216		45	6.2	0.244
50	5.71	0.225	50	6.33	0.249	6.09	0.24	50	6.03	0.237	5.81	0.229		50	6.68	0.263
55	6.1	0.24	55	6.54	0.257	6.68	0.263	55	6.52	0.257	6.19	0.244		55	6.94	0.273
60	6.29	0.248	60	6.68	0.263	6.78	0.267	60	6.61	0.26	6.58	0.259		60	7.27	0.286
65	6.59	0.259	65	6.65	0.262	7.03	0.277	65	6.85	0.27	6.83	0.269		65	8.01	0.315
70	6.92	0.272	70	6.83	0.269	7.2	0.283	70	7.07	0.278	7.03	0.277		70	8.36	0.329
75	7.32	0.288	75	6.9	0.272	7.34	0.289	75	7.32	0.288	7.18	0.283		75	8.4	0.331
80	7.32	0.288	80	7.07	0.278	7.35	0.289	80	7.57	0.298	7.45	0.293		80	8.62	0.339
85	**7.32**	0.288	86	7.08	0.279	7.35	0.289	85	7.65	0.301	7.68	0.302		85	8.6	0.339
								90	7.8	0.307	7.85	0.309		90	8.84	0.348
								95	7.8	0.307	7.85	0.309		97	8.84	0.348
								99	7.8	0.307	7.85	0.309				
Guides. from top			Guides. from top					Guides. from top						Guides. from top		
Nr.	cm	in	Nr.	cm	in			Nr.	cm	in	cm	in		Nr.	cm	in
0	0	0	0	0	0			0	0	0	0	0		0	0	0
1	11	4.3	1	11.2	4.4			1	15	5.9	15.3	6		1	18.2	7.2
2	26	10.2	2	26.2	10.5			2	33	13	33.5	13.2		2	41.5	16.3
3	43	16.9	3	43.9	17.3			3	51.5	20.3	52	20.5		3	66.7	26.3
4	61	24	4	61.9	24.4			4	70	27.6	70.5	27.8		4	93.3	36.7
5	79	31.1	5	80.4	31.6			5	88.5	34.8	89.5	35.2		5	119	46.9
6	98	38.6	6	99.2	39.1			6	107.3	42.2	108	42.5		6	144	56.7
7	117	46.1	7	118	46.5			7	127.4	50.2	128	50.4		7	174.5	68.7
8	137	53.9	8	140	55.1			8	148	58.3	148.4	58.4				
								9	168.5	66.3	168.5	66.3				
								10	189.5	74.6	189	74.4				

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Hørgård Konkurranse ED 8' 6" # 8					Hørgård Konkurranse D 9' 0" # 8			Hørgård Konkurranse B 9' 3" # 9			Hørgård Lillemor 8' 6" # 6			Hørgård Veslemøy 8' 6" # 6		
No. 118854					No. 117208			No. 93220						No. 98412 (1960)		
over varnish			over varnish		over varnish			over varnish			over varnish			over varnish		
Length (in)	Diam. (mm)	Diam. (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
1	2.38	0.094	2.24	0.088	1	2.35	0.093	1	2.6	0.102	1	2.19	0.086	1	2.54	0.1
5	2.67	0.105	2.73	0.107	5	2.88	0.113	5	2.95	0.116	5	2.56	0.101	5	2.74	0.108
10	3.17	0.125	3.12	0.123	10	3.35	0.132	10	3.3	0.13	10	3.02	0.119	10	3.05	0.12
15	3.52	0.139	3.46	0.136	15	3.7	0.146	15	3.87	0.152	15	3.41	0.134	15	3.64	0.143
20	4.06	0.16	3.87	0.152	20	4.08	0.161	20	4.3	0.169	20	3.65	0.144	20	3.97	0.156
25	4.55	0.179	4.33	0.17	25	4.5	0.177	25	4.87	0.192	25	4.04	0.159	25	4.45	0.175
30	4.85	0.191	4.69	0.185	30	4.82	0.19	30	5.3	0.209	30	4.4	0.173	30	4.65	0.183
35	5.22	0.206	5.1	0.201	35	5.18	0.204	35	5.7	0.224	35	4.92	0.194	35	5.04	0.198
40	5.62	0.221	5.47	0.215	40	5.6	0.22	40	6.14	0.242	40	5.26	0.207	40	5.48	0.216
45	6.07	0.239	5.95	0.234	45	6.05	0.238	45	6.43	0.253	45	5.71	0.225	45	5.89	0.232
50	6.32	0.249	6.26	0.246	50	6.5	0.256	50	6.85	0.27	50	5.94	0.234	50	6	0.236
55	6.83	0.269	6.84	0.269	55			55			55	6.2	0.244	55	6.58	0.259
60	7.27	0.286	7.37	0.29	60	7.45	0.293	60	7.75	0.305	60	6.68	0.263	60	7.15	0.281
65	7.75	0.305	7.87	0.31	65	8.1	0.319	65	8.1	0.319	65	7.11	0.28	65	7.42	0.292
70	8.08	0.318	8.34	0.328	70	8.53	0.336	70	8.4	0.331	70	7.64	0.301	70	7.74	0.305
75	8.55	0.337	8.7	0.343	75	8.93	0.352	75	9.1	0.358	75	8.08	0.318	75	8.28	0.326
80	8.98	0.354	9.14	0.36	80	9.35	0.368	80	9.55	0.376	80	8.45	0.333	80	8.76	0.345
85	9.4	0.37	9.56	0.376	85	9.82	0.387	85	10	0.394	85	8.82	0.347	85	9.03	0.356
90	9.9	0.39	10.02	0.394	90	10.25	0.404	90	10.24	0.403	90	9.22	0.363	90	9.47	0.373
95	10.4	0.409	10.48	0.413	95	10.8	0.425	95	10.65	0.419	95	9.62	0.379	95	9.91	0.39
100	10.87	0.428	10.94	0.431	100	11.21	0.441	100	11.07	0.436	100	10.02	0.394	100	10.35	0.407
102	11.02	0.434	11.07	0.436	108	11.84	0.466	111	11.88	0.468	102	10.16	0.4	102	10.5	0.413
Guides, from top					Guides, from top			Guides, from top			Guides, from top			Guides, from top		
Nr.	cm	in			Nr.	cm	in	Nr.	cm	in	Nr.	cm	in	Nr.	cm	in
0	0	0			0	0	0	0	0	0	0	0	0	0	0	0
1	17.5	6.9			1	14	5.5	1	18	7.1	1	17.2	6.8	1	17	6.7
2	39.5	15.6			2	33.5	13.2	2	37.5	14.8	2	38.5	15.2	2	38.5	15.2
3	64	25.2			3	54	21.3	3	57.5	22.6	3	63.8	25.1	3	63.8	25.1
4	90.5	35.6			4	75	29.5	4	78	30.7	4	89.5	35.2	4	89.5	35.2
5	118	46.5			5	98	38.6	5	101	39.8	5	116.5	45.9	5	116	45.7
6	150	59.1			6	123	48.4	6	125	49.2	6	148	58.3	6	148	58.3
7	184	72.4			7	149	58.7	7	151	59.4	7	183.8	72.4	7	183.5	72.2
8	177	69.7			8	175	68.9	8	177	69.7						
					9	202	79.5	9	212	83.5						

Table 4

Note:

"**Konkurranse**" is Norwegian for competition. All models have a hollow-built butt.

"**Lillemor**" (little mother) was the pet name of Asbjørn Hørgård's wife.

"**Veslemøy**" is Norwegian for "little maiden girl".

(Continued on page 44)

Figure 3

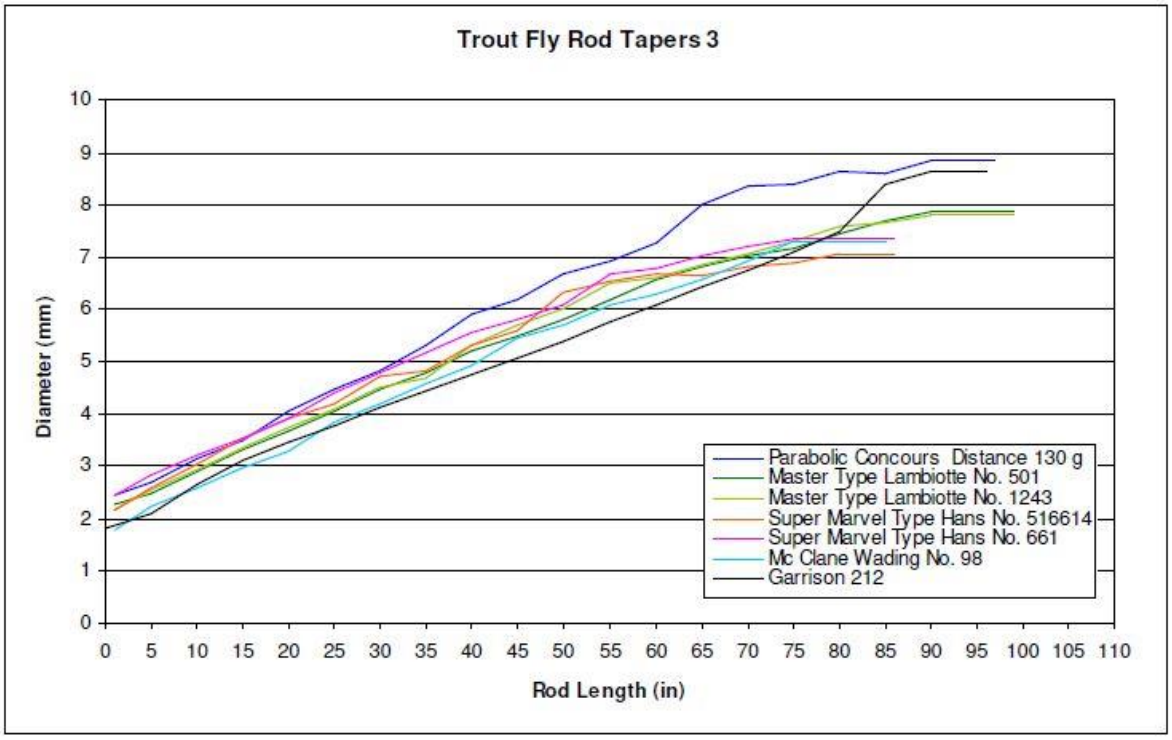
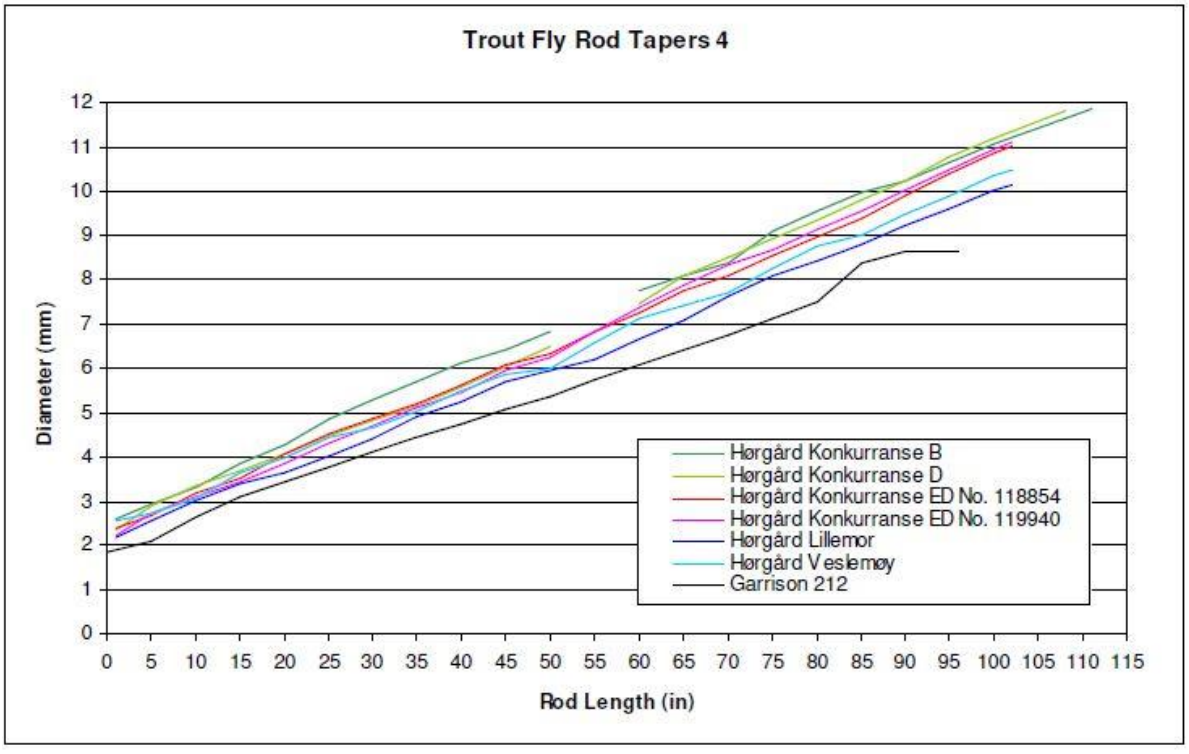


Figure 4



(Continued on page 45)

Salmon Fly Rod Tapers

Table 5

Hardy LRH Salmon Fly 14' 0" # 10/11 Nr. A/A (1966) over varnish			Hardy LRH Salmon Fly 14' 0" # 10/11 Nr. H 7500 (1956) over varnish			Hardy LRH Salmon Fly 14' 0" # 10/11 Nr. J 3986 C/X (1977) over varnish			Hardy LRH Spey Casting 13' 9" # 10/11 Nr. H 8355 (1956) over varnish			Hardy LRH Spey Casting 13' 9" # 10/11 Nr. H 26825 (1959) over varnish		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
1	3.88	0.153	1	3.77	0.149	1	3.68	0.135	1	4.18	0.164	1	4.18	0.164
5	4.28	0.168	5	4.13	0.162	5	3.97	0.146	5	4.53	0.178	5	4.52	0.178
10	4.97	0.196	10	4.84	0.191	10	4.7	0.175	10	5.17	0.203	10	5.22	0.206
15	5.6	0.221	15	5.54	0.218	15	5.47	0.205	15	5.9	0.232	15	5.88	0.231
20	6.31	0.248	20	6.28	0.247	20	6.05	0.228	20	6.49	0.255	20	6.5	0.256
25	6.73	0.265	25	6.9	0.272	25	6.59	0.25	25	7.07	0.278	25	6.95	0.274
30	7.17	0.282	30	7.42	0.292	30	7.07	0.268	30	7.37	0.29	30	7.31	0.288
35	7.62	0.3	35	7.9	0.311	35	7.51	0.286	35	7.71	0.304	35	7.63	0.3
40	8.08	0.318	40	8.4	0.331	40	7.99	0.305	40	8.04	0.316	40	8.1	0.319
45	8.5	0.335	45	8.84	0.348	45	8.45	0.323	45	8.46	0.333	45	8.57	0.337
50	8.9	0.35	50	9.16	0.361	50	8.84	0.338	50	8.92	0.351	50	8.95	0.352
53	9.19	0.362	53	9.27	0.365	54	9.14	0.346	52	9.13	0.359	52	9	0.354
60	10.06	0.396	60	10.06	0.396	60	10.13	0.385	60	9.57	0.377	60	9.57	0.377
65	10.26	0.404	65	10.41	0.41	65	10.5	0.4	65	9.77	0.385	65	9.9	0.39
70	10.55	0.415	70	10.63	0.419	70	10.86	0.414	70	10.08	0.397	70	10.19	0.401
75	10.95	0.431	75	11.01	0.433	75	11.14	0.425	75	10.36	0.408	75	10.49	0.413
80	11.13	0.438	80	11.34	0.446	80	11.34	0.433	80	10.72	0.422	80	10.76	0.424
85	11.44	0.45	85	11.54	0.454	85	11.67	0.446	85	10.88	0.428	85	11.02	0.434
90	11.67	0.459	90	11.84	0.466	90	11.97	0.457	90	11.23	0.442	90	11.25	0.443
95	11.95	0.47	95	12.01	0.473	95	12.26	0.469	95	11.49	0.452	95	11.67	0.459
100	12.13	0.477	100	12.29	0.484	100	12.5	0.478	100	11.86	0.467	100	11.99	0.472
105	12.43	0.489	105	12.67	0.499	105	12.63	0.484	105	11.86	0.467	105	12.03	0.474
109	12.76	0.502	109	12.59	0.496	109	12.84	0.492	106	12.09	0.476	106	12.08	0.475
116	14.01	0.551	116	12.79	0.504	116	13.68	0.525	115	12.36	0.487	115	12.63	0.497
120	14.4	0.567	120	13.11	0.516	120	14.02	0.538	120	12.65	0.498	120	13	0.512
125	14.68	0.578	125	13.43	0.529	125	14.45	0.555	125	12.97	0.511	125	13.23	0.521
130	15.1	0.595	130	13.74	0.541	130	14.86	0.571	130	13.29	0.523	130	13.6	0.535
135	15.57	0.613	135	14.3	0.563	135	15.39	0.592	135	13.67	0.538	135	13.88	0.547
140	16.29	0.641	140	14.82	0.583	140	15.79	0.608	140	14.03	0.552	140	14.18	0.558
145	16.29	0.641	145	14.82	0.583	145	15.79	0.608	142	14.12	0.556	145	14.18	0.558
150	16.29	0.641	150	14.82	0.583	150	15.79	0.608	150	14.12	0.556	150	14.18	0.558
155	16.29	0.641	155	14.82	0.583	155	15.79	0.608	155	14.12	0.556	155	14.18	0.558
160	16.29	0.641	160	14.82	0.583	160	15.79	0.608	160	14.12	0.556	160	14.18	0.558
165	16.29	0.641	165	14.82	0.583	165	15.79	0.608	165	14.12	0.556	165	14.18	0.558
168	16.29	0.641	168	14.82	0.583	168	15.79	0.608						

The **"LHR Salmon Fly"** is a powerful rod with "... the best line lifting and casting qualities" (L.R. Hardy). Note the taper difference between ordinary and "steel centred" (s.c.) rods. The rods weighed from 25 oz to 27 ½ oz. Handles varied from 24 ½ in. to 27 in.

The **"LRH Spey Casting"** was produced from 1957-1963. A rod for the true aficionados. The 1956 (!) rod has a rather short handle, of 24 in. only (compare Fig. 15, rod No. 6 from top). Possibly a prototype, as later rods had handles of 26 in. "With either a No. 5 Kingfisher line for greased line work or a No. 6 for heavier work this rod throws a measured 35 yards of line without difficulty, which is all that one wants for normal fishing". Studlock ferrules, to prevent the joints from twisting, and a zillion close tied intermediates (Kingisher Silk Line No. 5 ~ AFTM 9.3, No. 6 ~AFTM 11.3).

(Continued on page 46)

Table 6

Hardy LRH Greased Line 13' 0" # 8/9 Nr. H 21983 (1959) over varnish			Hardy LRH Greased Line 13' 0" # 8/9 Nr. H 26810 (1959) over varnish			Hardy Wye 13' 6" # 10 Nr. H 70133 (1965+) over varnish			Hardy Wye 13' 6" # 10 Nr. H 61028 (1964) over varnish			Hardy Wye 13' 6" # 10 Nr. HH C/M (03/1978) over varnish		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
1	3.13	0.123	1	2.8	0.11	1	3.27	0.129	1	3.37	0.133	1	3.32	0.131
5	3.55	0.14	5	3.32	0.131	5	3.72	0.146	5	3.62	0.143	5	3.8	0.15
10	4.31	0.17	10	3.93	0.155	10	4.4	0.173	10	4.22	0.166	10	4.43	0.174
15	4.91	0.193	15	4.59	0.181	15	4.94	0.194	15	4.87	0.192	15	5.04	0.199
20	5.44	0.214	20	5.05	0.199	20	5.37	0.211	20	5.4	0.213	20	5.61	0.221
25	6.03	0.237	25	5.54	0.218	25	5.88	0.231	25	5.98	0.236	25	6.15	0.242
30	6.34	0.25	30	5.87	0.231	30	6.39	0.252	30	6.44	0.254	30	6.55	0.258
35	6.76	0.266	35	6.31	0.248	35	6.81	0.268	35	6.91	0.272	35	7.01	0.276
40	7.11	0.28	40	6.71	0.264	40	7.34	0.289	40	7.45	0.293	40	7.59	0.299
45	7.39	0.291	45	7.08	0.279	45	7.74	0.305	45	7.87	0.31	45	8.06	0.317
49	7.65	0.301	49	7.28	0.287	50	8.12	0.32	50	8.32	0.327	50	8.37	0.329
						52	8.23	0.324	52	8.48	0.334	52	8.58	0.338
55	8.28	0.326	55	7.97	0.314									
60	8.67	0.341	60	8.39	0.33	57	8.82	0.347	57	8.87	0.349	57	8.98	0.354
65	8.91	0.351	65	8.63	0.34	60	9.08	0.357	60	9.2	0.362	60	9.23	0.364
70	9.3	0.366	70	9.03	0.356	65	9.37	0.369	65	9.41	0.37	65	9.51	0.374
75	9.51	0.375	75	9.14	0.36	70	9.66	0.38	70	9.67	0.381	70	9.71	0.382
80	9.91	0.39	80	9.51	0.374	75	9.85	0.388	75	9.91	0.39	75	10.08	0.397
85	10.1	0.398	85	9.74	0.383	80	10.23	0.403	80	10.22	0.402	80	10.36	0.408
90	10.41	0.41	90	10.02	0.394	85	10.44	0.411	85	10.52	0.414	85	10.62	0.418
95	10.69	0.421	95	10.35	0.407	90	10.75	0.423	90	10.75	0.423	90	10.93	0.43
100	11.04	0.435	100	10.51	0.414	95	11.09	0.437	95	11.15	0.439	95	11.19	0.441
						100	11.4	0.449	100	11.55	0.455	100	11.52	0.454
108	11.03	0.434	108	10.83	0.426	105	11.67	0.459	105	11.85	0.467	105	11.84	0.466
110	11.19	0.441	110	11	0.433									
115	11.58	0.456	115	11.2	0.441	112	11.98	0.472	112	12.12	0.477	112	12.09	0.476
120	12.15	0.478	120	11.49	0.452	115	12.33	0.485	115	12.31	0.485	115	12.34	0.486
125	12.42	0.489	125	11.92	0.469	120	12.62	0.497	120	12.73	0.501	120	12.65	0.498
130	12.57	0.495	130	12.31	0.485	125	13.03	0.513	125	13.09	0.515	125	13.24	0.521
133	12.8	0.504	133	12.31	0.485	130	13.45	0.529	130	13.54	0.533	130	13.53	0.533
140	12.8	0.504	140	12.31	0.485	135	13.7	0.539	135	13.97	0.55	135	14.04	0.553
145	12.8	0.504	145	12.31	0.485	138	14.02	0.552	138	14.24	0.56	138	14.09	0.555
150	12.8	0.504	150	12.31	0.485	140	14.02	0.552	140	14.24	0.56	140	14.09	0.555
156	12.8	0.504	156	12.31	0.485	145	14.02	0.552	145	14.24	0.56	145	14.09	0.555
						150	14.02	0.552	150	14.24	0.56	150	14.09	0.555
						155	14.02	0.552	155	14.24	0.56	155	14.09	0.555
						160	14.02	0.552	160	14.24	0.56	160	14.09	0.555
						162	14.02	0.552	162	14.24	0.56	162	14.09	0.555

The **"LHR Double-Handed Greased Line",** of 13 feet, is a clear cousin to the "AHE Wood" (compare tapers). A foot longer, and "...the best length and type of rod for greased line fishing. Light Fly Action." (L.R. Hardy). Handle 23 in. long.

The **"Wye"** is sort of a workhorse and one of the most popular salmon rods Hardy's have ever produced. Through its long time of production (1914-1978) it was made in 10' 6", 11', 12' 6", 13' 6" as three piece rods, and in 10' 6" and 11' as two piece rods. "Butt action, powerful rod for long casting, will Spey cast" (L.R. Hardy). Handle length 13' 6" rods: 26 in., from 1962: 24 in. 12' 6" rods: 24 in.

(Continued on page 47)

Numbers in blue are put in as possible continuation of last measured value in front of handle.

Table 7

Hardy Wye 13' 6" # 10 p.n. (1914-1978) without varnish			**Hardy Wye 12' 6" # 9/10** Nr. E 98184 (1955) over varnish			**Hardy Wye 10' 6" #9** Nr. H 19515 (1958) over varnish			**Hardy AHE Wood Nr. 3 12' 0" # 8/9** Nr. H 19227 (1958) over varnish			**Hardy Grant Vibration 13' 2" # 10** Nr. 4971 (1948) without varnish - Greenheart		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
1	3.2	0.126	1	3.14	0.124	1	2.81	0.111	1	2.85	0.112	1	3.67	0.144
5	3.65	0.144	5	3.75	0.148	5	3.24	0.128	5	3.2	0.126	5	4.28	0.169
10	4.3	0.169	10	4.3	0.169	10	3.91	0.154	10	3.8	0.15	10	4.98	0.196
15	4.97	0.196	15	4.83	0.19	15	4.45	0.175	15	4.45	0.175	15	5.73	0.225
20	5.6	0.22	20	5.22	0.206	20	4.76	0.187	20	4.88	0.192	20	6.58	0.259
25	6.08	0.239	25	5.54	0.218	25	5.04	0.198	25	5.31	0.209	25	6.89	0.271
30	6.46	0.254	30	5.9	0.232	30	5.31	0.209	30	5.7	0.224	30	7.33	0.289
35	6.94	0.273	35	6.45	0.254	35	5.59	0.22	35	6.25	0.246	35	7.79	0.307
40	7.5	0.295	40	6.92	0.272	40	5.99	0.236	40	6.63	0.261	40	8.25	0.325
45	7.95	0.313	45	7.35	0.289				45	7.08	0.279	45	8.66	0.341
50	8.25	0.325	50	7.55	0.297	50	7.22	0.284						
						55	7.5	0.295	50	7.8	0.307	56	9.57	0.377
60	9	0.354	55	8.4	0.331	60	7.94	0.313	55	8	0.315	60	9.95	0.392
65	9.3	0.366	60	8.72	0.343	65	8.19	0.322	60	8.3	0.327	65	10.24	0.403
70	9.55	0.376	65	9.15	0.36	70	8.56	0.337	65	8.65	0.341	70	10.63	0.419
75	9.9	0.39	70	9.47	0.373	75	8.87	0.349	70	8.85	0.348	75	10.92	0.43
80	10.3	0.406	75	9.76	0.384	80	9.09	0.358	75	9.2	0.362	80	11.14	0.438
85	10.48	0.413	80	10.02	0.394				80	9.4	0.37	85	11.35	0.447
90	10.72	0.422	85	10.33	0.407	85	9.51	0.374	85	9.65	0.38	90	11.52	0.454
95	11	0.433	90	10.54	0.415	90	10.21	0.402	90	9.9	0.39	95	11.86	0.467
100	11.35	0.447	95	10.81	0.426	95	10.39	0.409	95	10.1	0.398	96	12.07	0.475
105	11.8	0.465				100	10.74	0.423						
			105	11.38	0.448	105	11.19	0.441	100	10.2	0.402	108	13.09	0.515
115	12.3	0.484	110	11.57	0.456	110	11.51	0.453	105	10.6	0.417	110	13.57	0.534
120	12.6	0.496	115	11.81	0.465	115	11.51	0.453	110	11.2	0.441	115	13.76	0.542
125	13	0.512	120	12.05	0.474	120	11.51	0.453	115	11.7	0.461	120	13.99	0.551
130	13.5	0.531	125	12.42	0.489	126	11.51	0.453	120	11.9	0.469	125	14.35	0.565
135	13.9	0.547	130	12.42	0.489				125	12.3	0.484	130	14.72	0.58
140	13.9	0.547	135	12.42	0.489				130	12.3	0.484	133	14.72	0.58
145	13.9	0.547	140	12.42	0.489				135	12.3	0.484	135	14.72	0.58
150	13.9	0.547	145	12.42	0.489				140	12.3	0.484	140	14.72	0.58
162	13.9	0.547	150	12.42	0.489				144	12.3	0.484	145	14.72	0.58
												150	14.81	0.583
												155	14.81	0.583
												158	14.81	0.583

AHE Wood, of Cairnton on Deeside, inventor and pioneer of "greased line fishing", used the rods built after his design one-handed. All three of them are 12 feet long. The lightest one, "AHE Wood No. 1", weighs 12 oz 6 drm. The No. 2 weighs 12 oz 10 drm. The strongest, **No. 3**, weighs 13 1/2 oz., "medium stiff." (L.R. Hardy). Handle length 21 in. A "Corona No. 7 Fine Salmon Line" was recommended for the Nr. 3, = approx. AFTM 8.4.

The **"Grant Vibration",** of measured 13' 2", is a rather short rod. They were made up to and over 18 feet. The Mother of Spey Rods.

(Continued on page 48)

Table 8:

Pezon & Michel Parabolic Saumon 13' 0" # 9/10 No. 285599 (1959) without varnish			Pezon & Michel Parabolic Saumon 12' 0" # 9 without varnish			Hørgård Namsen 15' 10" # 12 over varnish			Hørgård Orkla 14' 6" # 10/11 over varnish			Sharpe's Spliced 12' 0" # 8/9 impregnated		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
2	3.7	0.146	2	3.25	0.128	1	4.8	0.189	1	2.94	0.116	1	2.92	0.115
5	3.88	0.153	5	3.45	0.136	5	5.3	0.209	5	3.54	0.139	5	3.6	0.142
10	4.38	0.172	10	3.83	0.151	10	6	0.236	10	4.32	0.17	10	4.03	0.159
15	4.75	0.187	15	4.25	0.167	15	6.7	0.264	15	4.98	0.196	15	4.86	0.191
20	5.26	0.207	20	4.7	0.185	20	7.35	0.289	20	5.48	0.216	20	5.2	0.205
25	5.68	0.224	25	5.02	0.198	25	7.75	0.305	25	5.97	0.235	25	5.75	0.226
30	6.14	0.242	30	5.42	0.213	30	8.15	0.321	30	6.35	0.25	30	5.96	0.235
35	6.5	0.256	35	5.76	0.227	35	8.37	0.33	35	6.77	0.266	35	6.55	0.258
40	6.82	0.269	40	6.1	0.24	40	8.5	0.335	40	7.13	0.281	40	7.16	0.282
45	7.25	0.285	45	6.25	0.246	45	8.6	0.339	45	7.56	0.297	45	7.65	0.301
50	7.65	0.301				50	8.7	0.343	50	8.07	0.318	50		
			50	7.08	0.279	55	8.7	0.343	55	8.45	0.332	55		
55	8.3	0.327	55	7.41	0.292	60	8.8	0.346	60			60	8.8	0.346
60	8.65	0.341	60	7.73	0.304				65	9.92	0.391	65	9.01	0.355
65	9	0.354	65	7.88	0.31	65	10.3	0.406	70	10.37	0.408	70	9.12	0.359
70	9.4	0.37	70	8.23	0.324	70	10.9	0.429	75	10.9	0.429	75	9.35	0.368
75	9.7	0.382	75	8.55	0.337	75	11.6	0.457	80	11.3	0.445	80	9.71	0.382
80	10	0.394	80	8.93	0.352	80	12	0.472	85	11.85	0.467	85	10.08	0.397
85	10.3	0.406	85	9.36	0.369	85	12.5	0.492	90	12.15	0.478	90	10.28	0.405
90	10.5	0.413	90	9.68	0.381	90	13	0.512	95	12.4	0.488	95		
95	10.8	0.425	95	9.88	0.389	95	13.2	0.52	100	12.7	0.5	100		
100	11.16	0.439				100	13.5	0.531	105	12.9	0.508	105	10.87	0.428
			100	10.12	0.398	105	13.7	0.539	110	13.1	0.516	110	11	0.433
105	11.55	0.455	105	10.72	0.422	110	13.9	0.547	115			115	11.35	0.447
110	11.9	0.469	110	10.82	0.426	115	14	0.551	120	14.45	0.569	120	11.36	0.447
115	12	0.472	115	10.85	0.427	120	14	0.551	125	15.1	0.594	125	11.93	0.47
120	12.1	0.476	120	11.03	0.434	125			130	15.8	0.622	130	11.93	0.47
125	12.22	0.481	125	11.19	0.441	130	15.6	0.614	135	16.4	0.646	135	11.93	0.47
130	12.46	0.491	130	11.3	0.445	135	15.9	0.626	140	16.8	0.661	140	11.93	0.47
135	12.6	0.496	135	11.5	0.453	140	16.1	0.634	145	17.25	0.679	144	11.93	0.47
140	12.84	0.506	140	11.64	0.458	145	16.4	0.646	150	17.5	0.689			
145	13.05	0.514	144	11.78	0.464	150	16.56	0.652	155	17.5	0.689			
150	13.25	0.522				155	16.8	0.661	160	17.5	0.689			
156	13.4	0.528				160	17.1	0.673	165	17.5	0.689			
						165	17.1	0.673	170	17.5	0.689			
						170	17.1	0.673	174	17.5	0.689			
						175	17.1	0.673						
						180	17.1	0.673						
						185	17.1	0.673						
						190	17.1	0.673						

Note:

"**Namsen**" and "**Orkla**" are names of Norwegian salmon rivers.

(Continued on page 49)

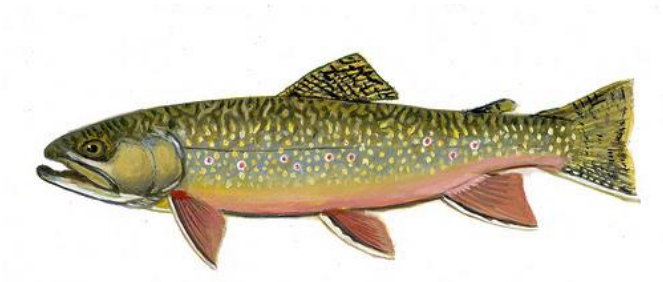


Table 9:

Sharpe's Spliced 13' 0" # 9 impregnated			HLL Salmon 15 15' 0" 1881-1908 - 2 mids 3 tips without varnish			HLL Salmon 16 16' 0" 1881-1908 - 1 mid 2 tips without varnish			HLL Salmon 18 18' 0" ca. 1900 - 2 mids 3 tips over varnish			Payne 223 11' 6" 1951-1974 over varnish		
Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)	Length (in)	Diam. (mm)	Diam. (in)
1	3.56	0.14	1	2.55	0.1	1	3.02	0.119	2	3.6	0.142	1	2.28	0.09
5	3.92	0.154	5	3.04	0.12	5	3.31	0.13	5	3.7	0.146	5	2.58	0.102
10	4.37	0.172	10	3.68	0.145	10	3.91	0.154	10	4.2	0.165	10	2.98	0.117
15	4.9	0.193	15	4.1	0.161	15	4.42	0.174	15	4.76	0.187	15	3.56	0.14
20	5.3	0.209	20	4.51	0.178	20	5.18	0.204	20	5.25	0.207	20	4.08	0.161
25	5.9	0.232	25	4.92	0.194	25	5.85	0.23	25	5.97	0.235	25	4.5	0.177
30	6.33	0.249	30	5.37	0.212	30	6.18	0.243	30	6.42	0.253	30	4.88	0.192
35	6.8	0.268	35	5.81	0.229	35	6.62	0.26	35	7	0.276	35	5.2	0.205
40	7.2	0.283	40	6.21	0.244	40	7.04	0.277	40	7.38	0.291	40	5.52	0.217
45	7.77	0.306	45	6.6	0.26	45	7.57	0.298	45	7.9	0.311	45	5.8	0.228
48	8.05	0.317	50	6.96	0.274	50	7.83	0.308	50	8.48	0.334			
			55	7.19	0.283	55	8.23	0.324	55	9	0.354	50	6.22	0.245
61	8.8	0.346	58	7.49	0.295	60	8.47	0.333	60	9.44 0.3	72	55	6.66	0.262
65	8.98	0.354				62	8.63	0.34	65	9.85	0.388	60	7.08	0.279
70	9.27	0.365	65	7.77	0.306				70	10.2	0.402	65	7.54	0.297
75	9.52	0.375	70	8.32	0.327	68	8.95	0.352				70	7.8	0.307
80	9.8	0.386	75	8.78	0.345	70	9.16	0.361	80	11.3	0.445	75	8.16	0.321
85	10.06	0.396	80	9.15	0.36	75	9.56	0.376	85	11.5	0.453	80	8.5	0.335
90	10.35	0.407	85	9.59	0.378	80	9.89	0.389	90	11.9	0.469	85	8.84	0.348
95	10.65	0.419	90	9.97	0.393	85	10.18	0.401	95	12.4	0.488	90	9.14	0.36
			95	10.21	0.402	90	10.58	0.417	100	12.79	0.504			
116	12.2	0.48	100	10.45	0.411	95	10.98	0.432	105	13.3	0.524	95	9.42	0.371
120	12.47	0.491	105	10.69	0.421	100	11.46	0.451	110	13.75	0.541	100	9.82	0.387
125	12.8	0.504	110	11.17	0.44	105	11.98	0.472	115	14.3	0.563	105	10.22	0.402
130	13.2	0.52	115	11.62	0.457	110	12.43	0.489	120	14.8	0.583	110	10.64	0.419
135	13.47	0.53	117	11.65	0.458	115	12.68	0.499	125	15	0.591	115	13	0.512
140	13.47	0.53				120	12.96	0.51	130	15.4	0.606	120	13	0.512
145	13.47	0.53	124	12.51	0.493	125	13.33	0.525	135	16	0.63	125	13	0.512
150	13.47	0.53	125	12.53	0.493							130	13	0.512
155	13.47	0.53	130	13.09	0.515	132	14.2	0.559	150	16.5	0.65	135	13	0.512
156	13.47	0.53	135	13.47	0.53	135	14.23	0.56	155	17	0.669	138	13	0.512
			140	13.86	0.546	140	14.55	0.573	160	17.62	0.694			
			145	14.4	0.567	145	15	0.591	165	18.16	0.715			
			150	14.87	0.585	150	15.25	0.6	170	18.8	0.74			
			152	15.08	0.594	155	15.6	0.614	175	19.29	0.759			
			154	15.26	0.601	160	16.17	0.637	180	19.9	0.783			
			155	15.4	0.606	165	16.64	0.655	185	20.6	0.811			
			156	15.57	0.613	166	16.7	0.657	186	20.68	0.814			
			157	15.84	0.624	167	16.87	0.664	187	20.76	0.817			
			180	16	0.63	168	17.55	0.691	189	21.44	0.844			
						169	18.43	0.726	190	22.7	0.894			
						192	18.44	0.726	216	22.7	0.894			

(Continued on page 50)

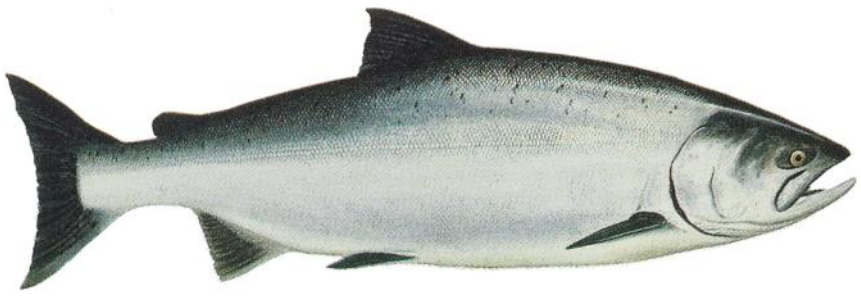


Figure 5:

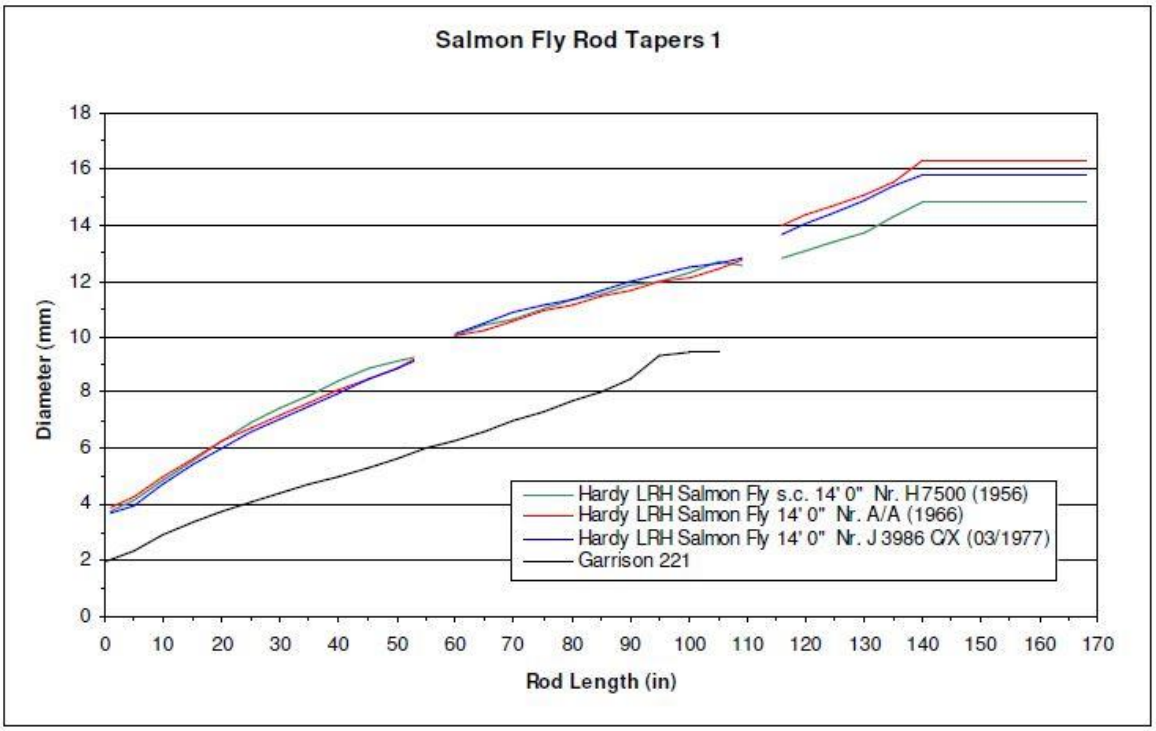


Figure 6:

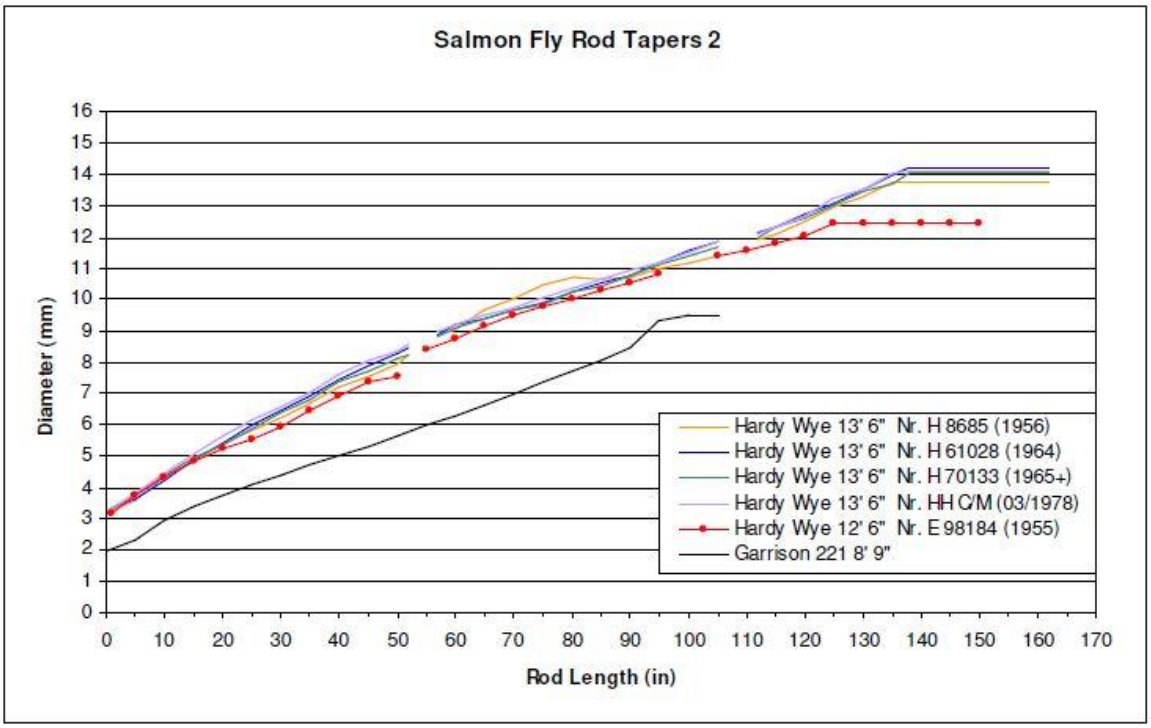


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Figure 7:

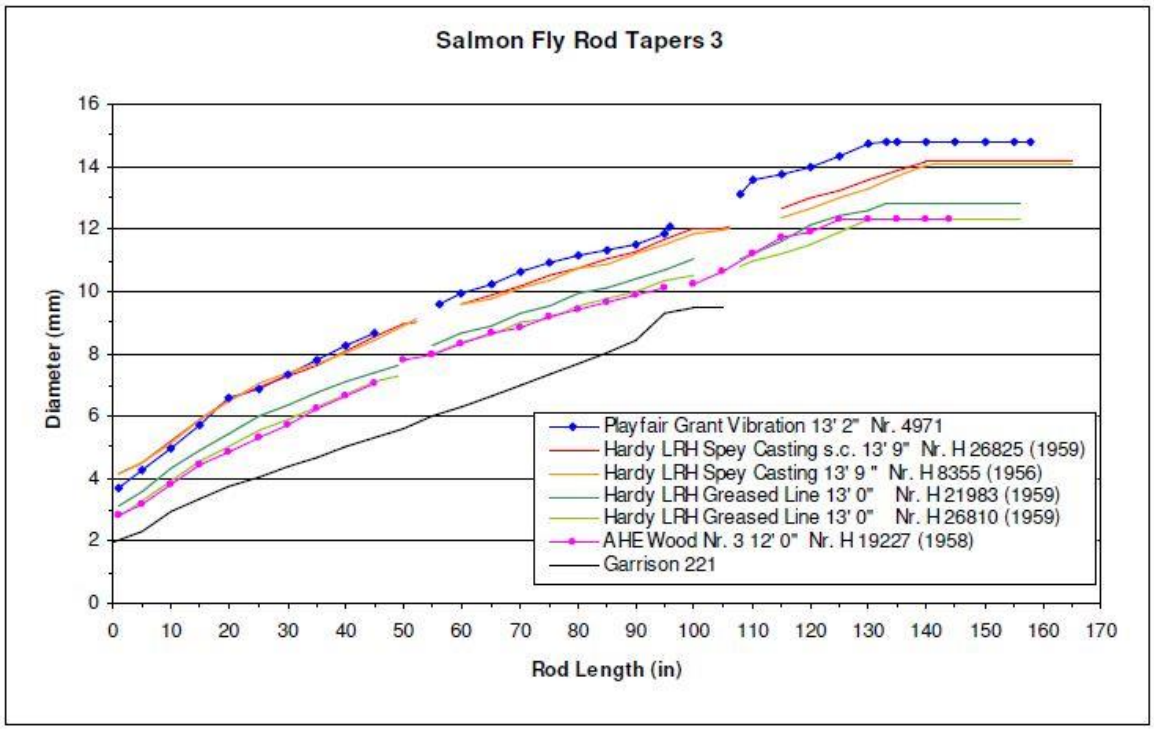

Figure 8:

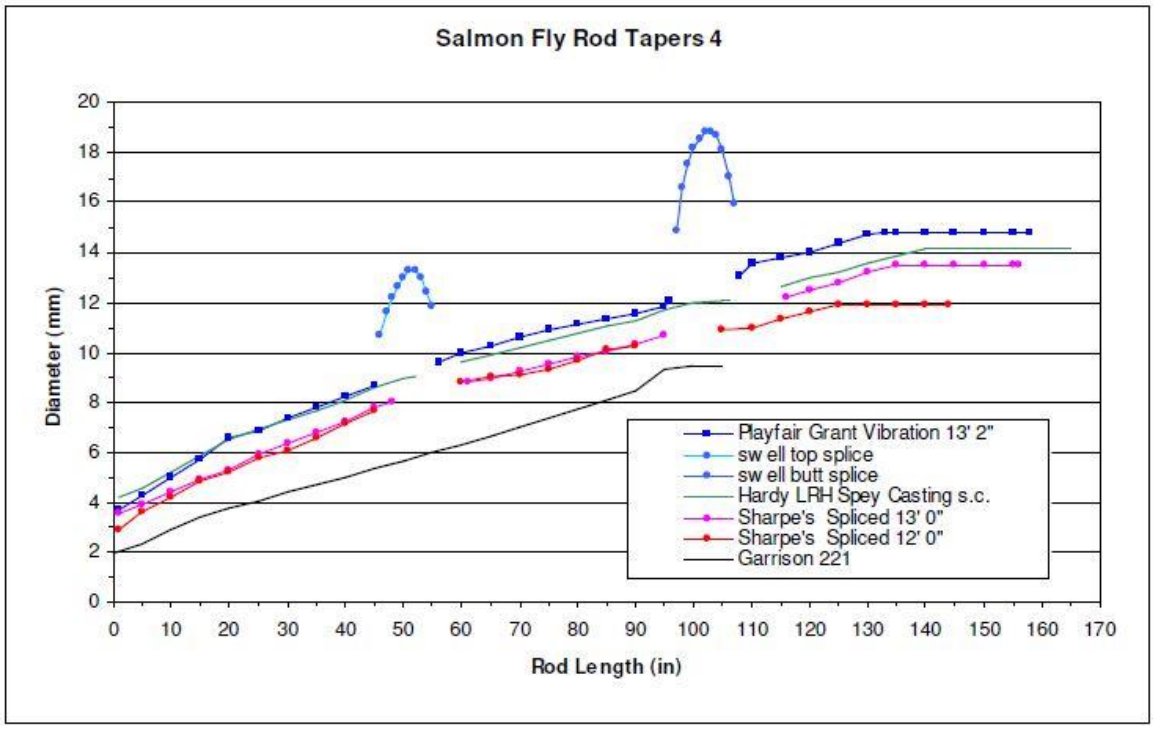

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Figure 9:

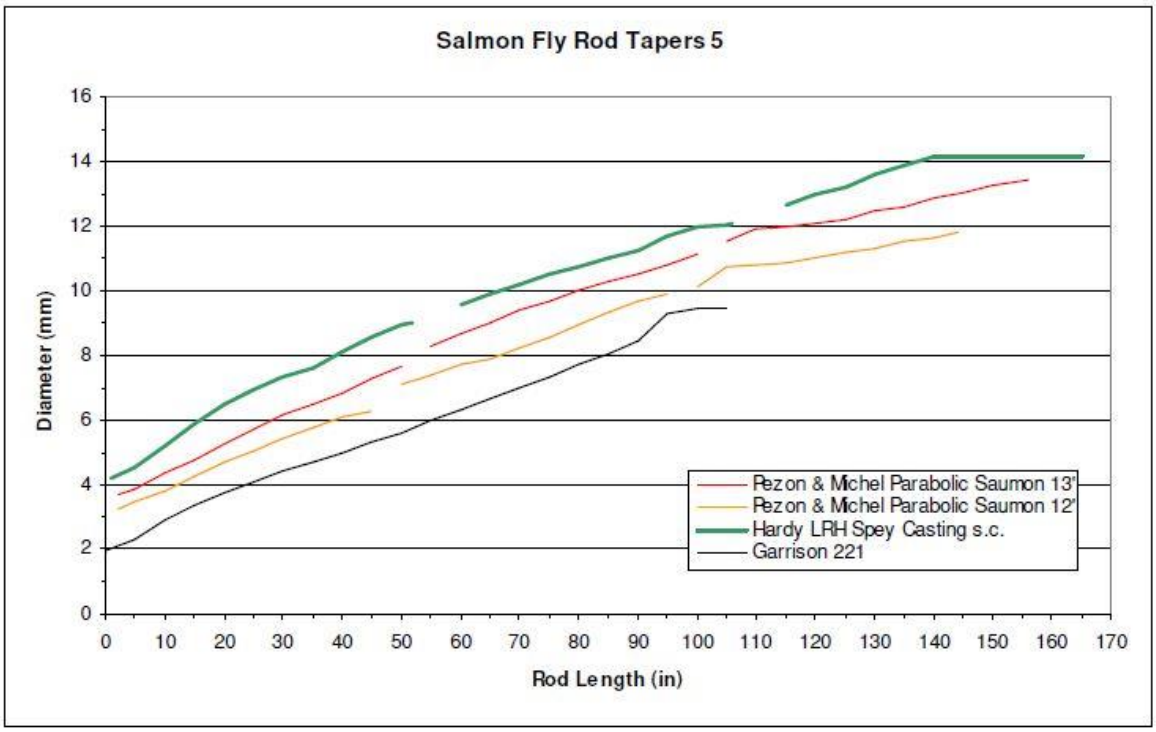

Figure 10:

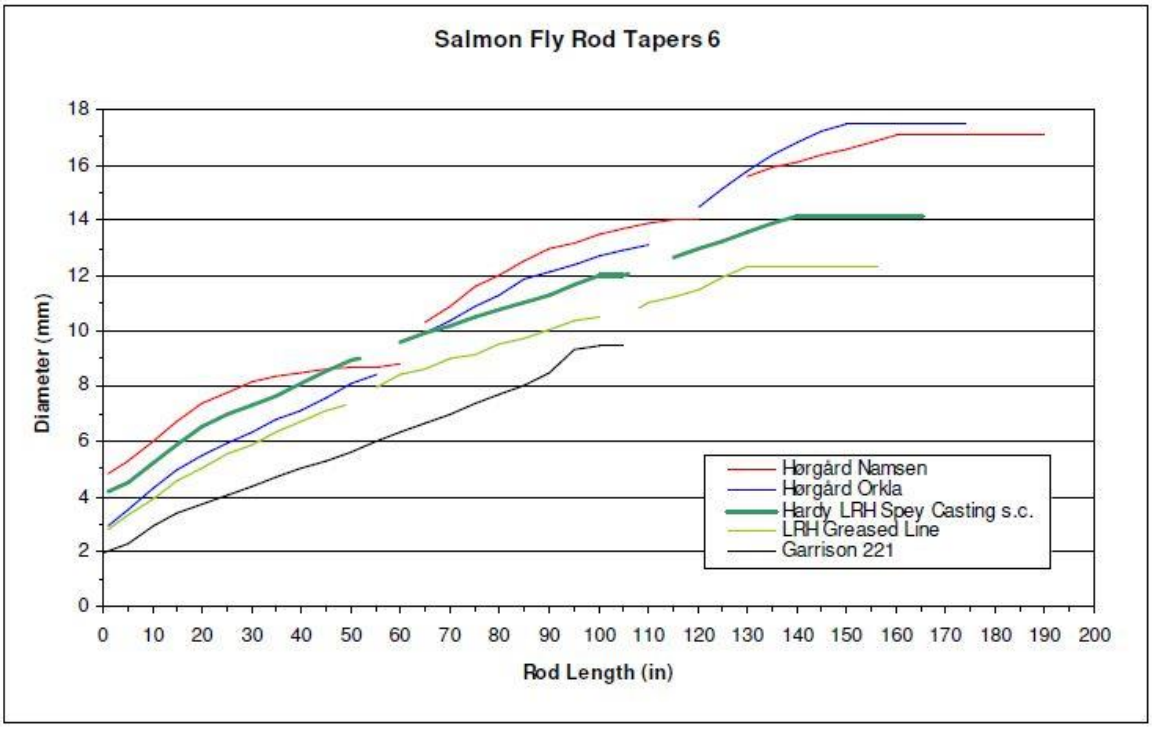

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Figure 11:

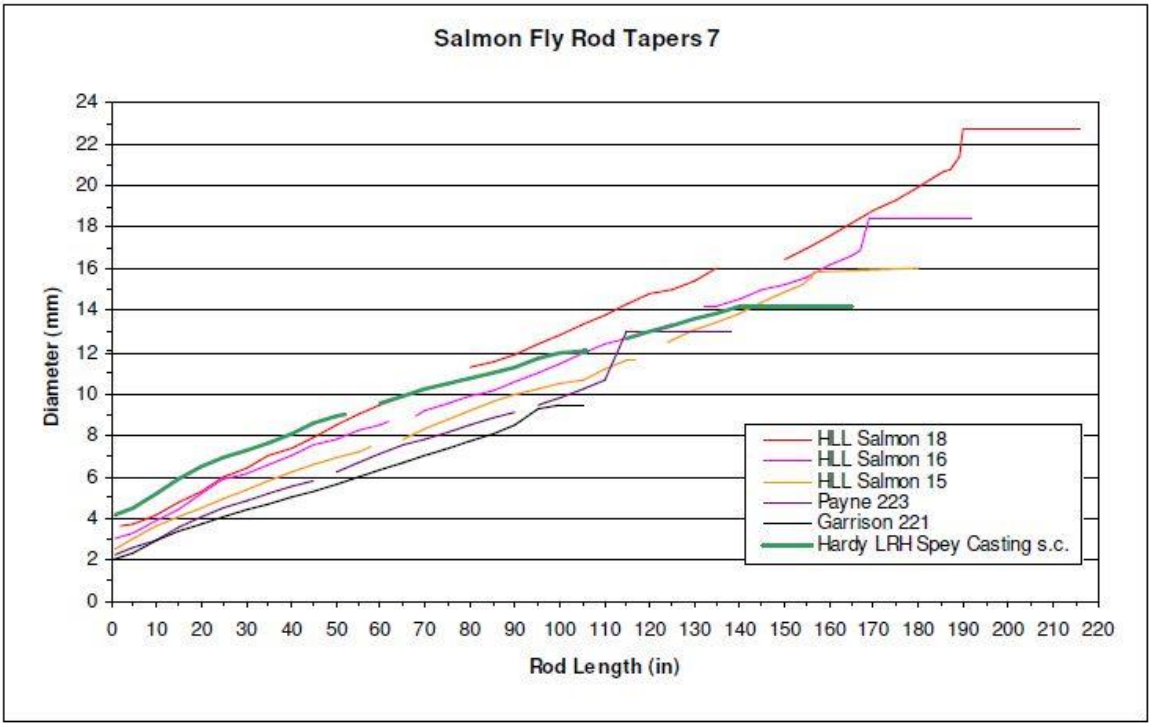

Figure 12:

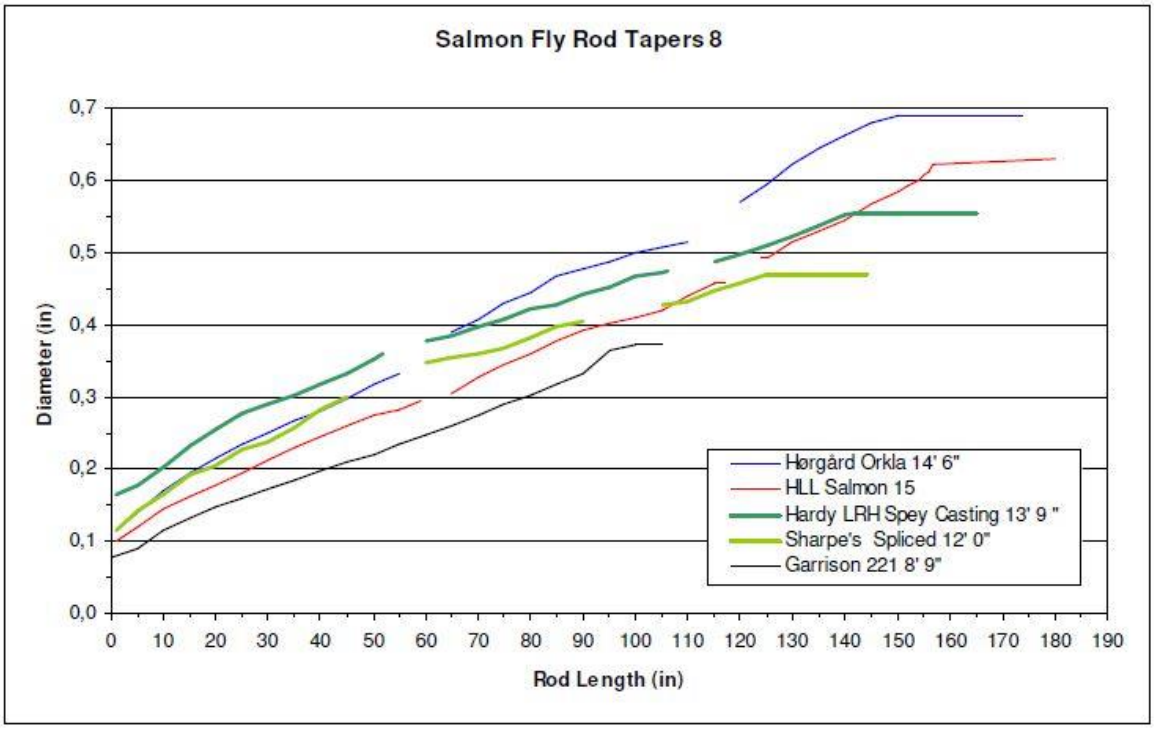

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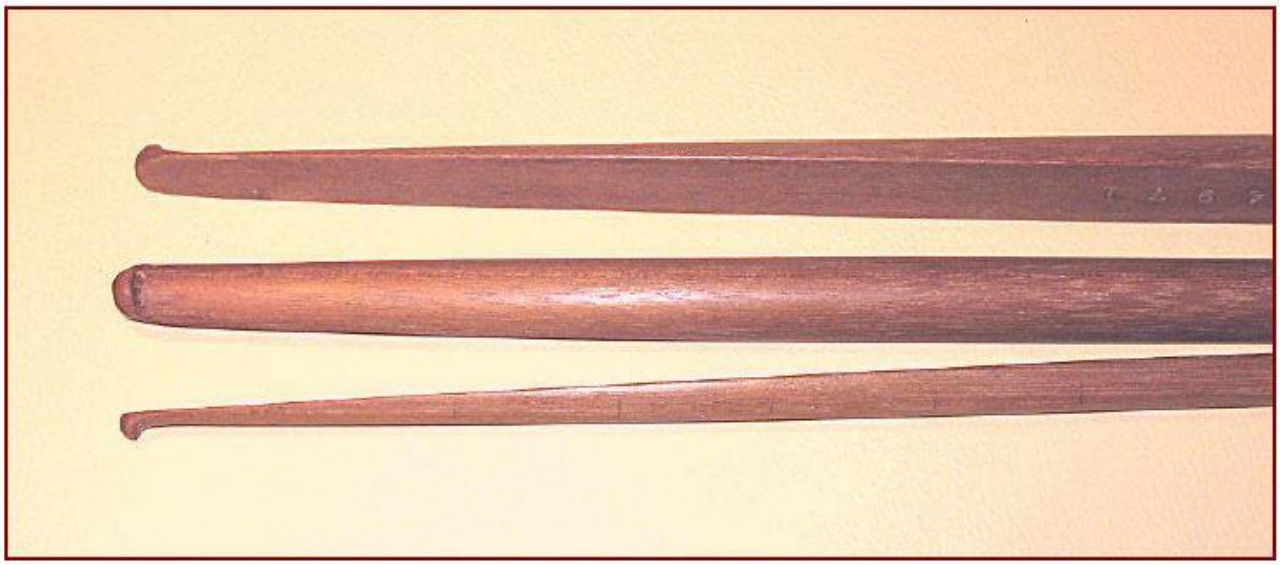
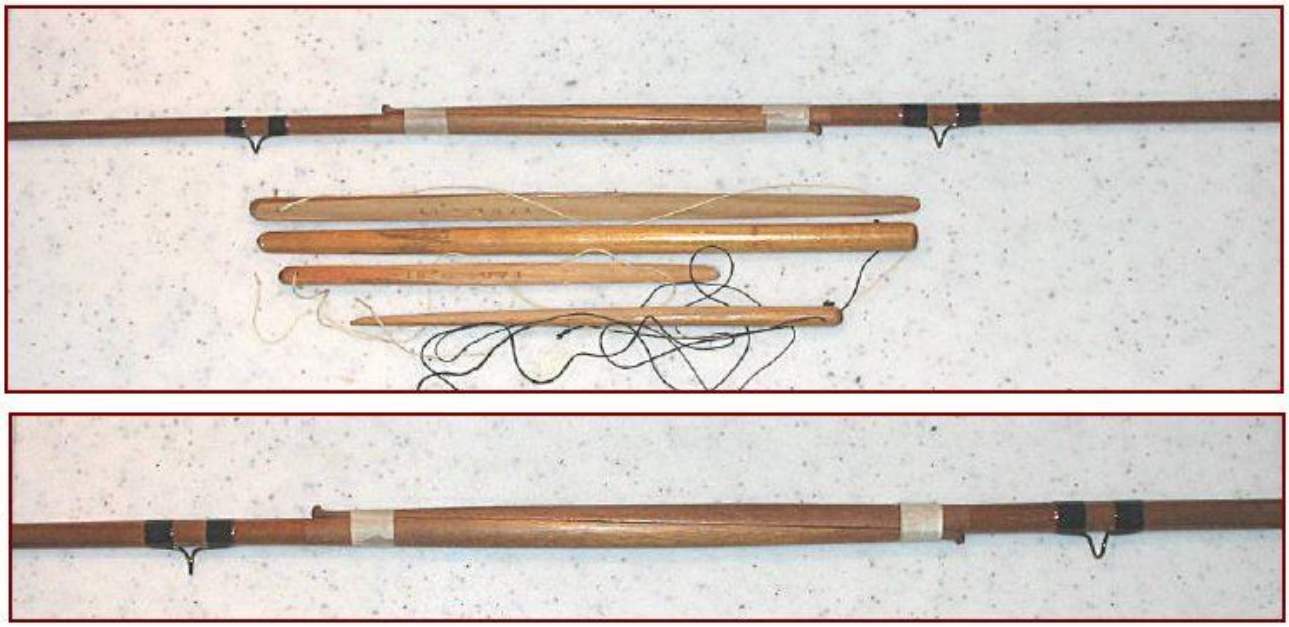
Figure 13:



Splices of butt, lower mid, and top joint of the "Grant Vibration", with their turned up ends. Stamped into all flats: "Grants Patent", and the rod No. 4971 (see top right on photo). The splices are 11" and 7 ½ " long, respectively.

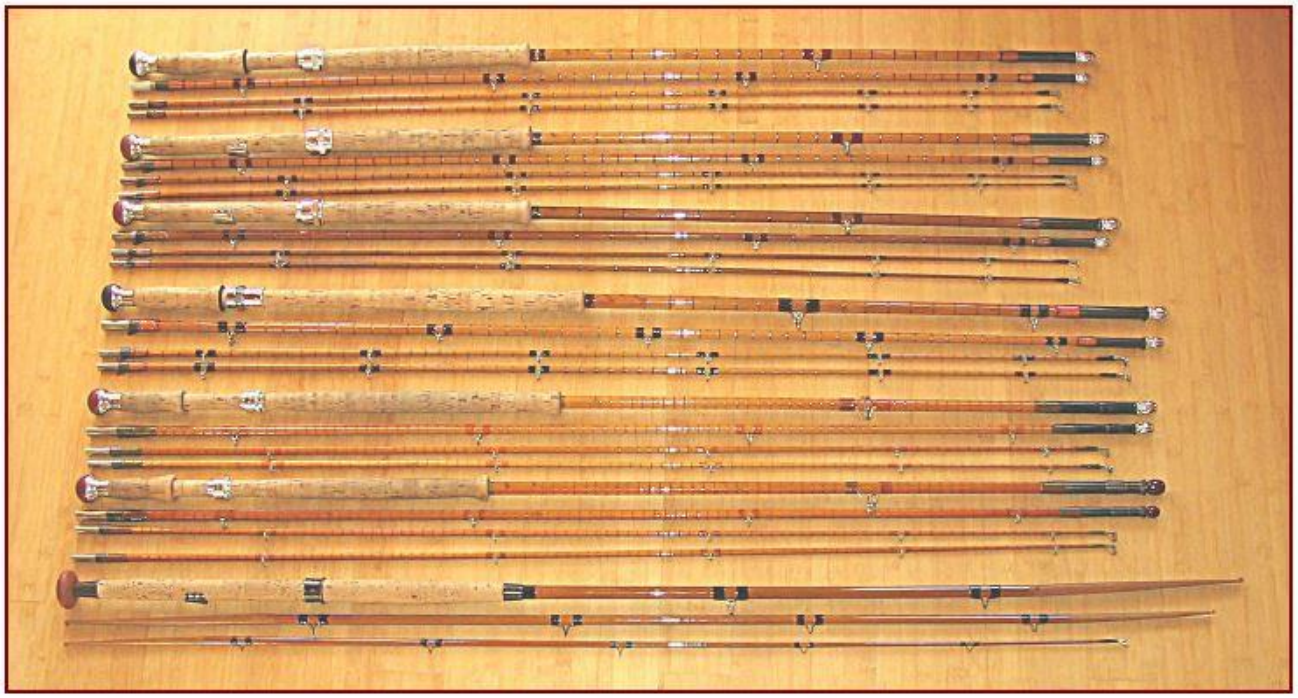
Figure 14a + b:



"Grant Vibration", bottom and top splices joined with tape. The severe swell over the splices is clearly visible, (cf. Figure 8). Also pictured the splice protectors, with rod length and number stamped into the flats.

(Continued on page 55)

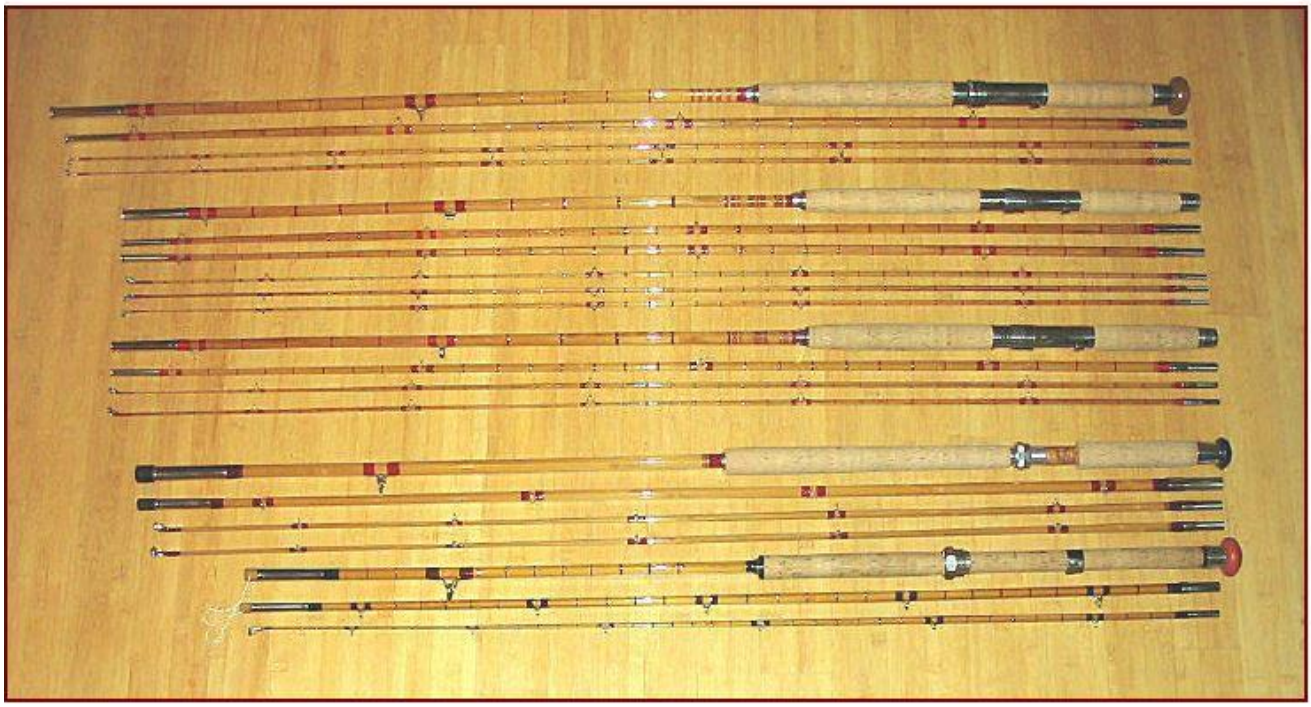
Figure 15:



Six Hardy Salmon Rods. From top: three "Wye", 13' 6", the third one "dark cane", one "LRH Salmon Fly", and two "LRH Spey Casting", all with two tops. Note the different handle-lengths of the latter two. The bottom rod is a Playfair "Grant Vibration", of Greenheart, spliced, single tip, splice protectors removed.

(Continued on page 56)

Figure 16:



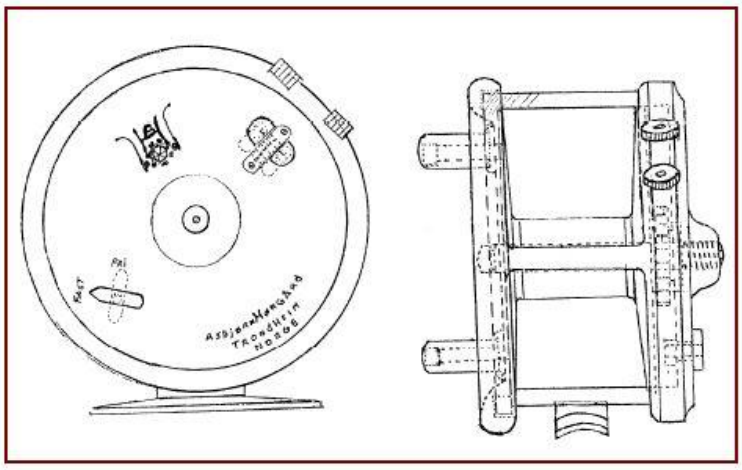


Figure 17a:

Left: Drawings (part) of a fly reel, which Asbjørn Hørgård made in February 1945 on toilet paper while in prison during WW II. The reel was produced, with some changes from the drawing (the brake system is different), from right after the war to 1984 in 4¼ in diameter and simply named "Hørgård Laksesnelle" (Hørgård Salmon Reel). He never made any other sizes. The legendary reel was synonymous with rigidity and served generations of salmon anglers as a sturdy and reliable work horse, and complimented the Hørgård Salmon Rods. Frame and spool aluminum, reel foot brass, internal parts brass and steel, weight 472 grams (16.65 oz).

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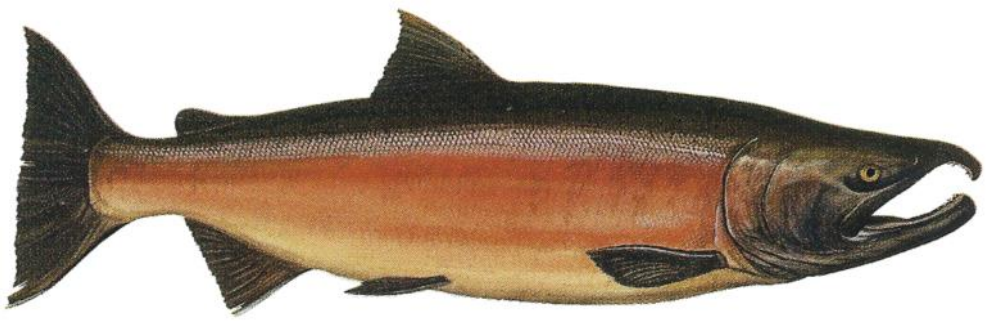

Figures 17b & c:

Pictures of the reel.

Hørgård rough milling machine

Hørgård taper milling machine

Both mills and other items are displayed at the "Norsk Skogsmuseum" (Norwegian Forestry Museum) in Elverum/Norway.

Reference:

[1]Sir Henry Pottinger, in his 2-volume book: “Flood, Fell, and Forest“ (1905), describes the rod he was using in 1857 during his fishing trip down the Tana River thus: “It is twenty feet long, in four joints, made of hickory; the butt is at the grasp five inches in circumference; and the total weight is five pounds.” When the third joint of the rod broke he had to “...fall back on what I call my little seventeen-foot Irish rod, ...feeling like a wand in the hand...”. The Tana River system, of some 1000 km (620 miles), tributaries included, is the largest Salmon River in Scandinavia and known for its big fish. In 1928 Henrik Henriksen landed the world record salmon of 35.89 kg (79.12 pounds), on spinning tackle. The fight lasted 9 hours. The largest-ever salmon from the Tana was 39 kg (86 pounds), taken in a net.

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