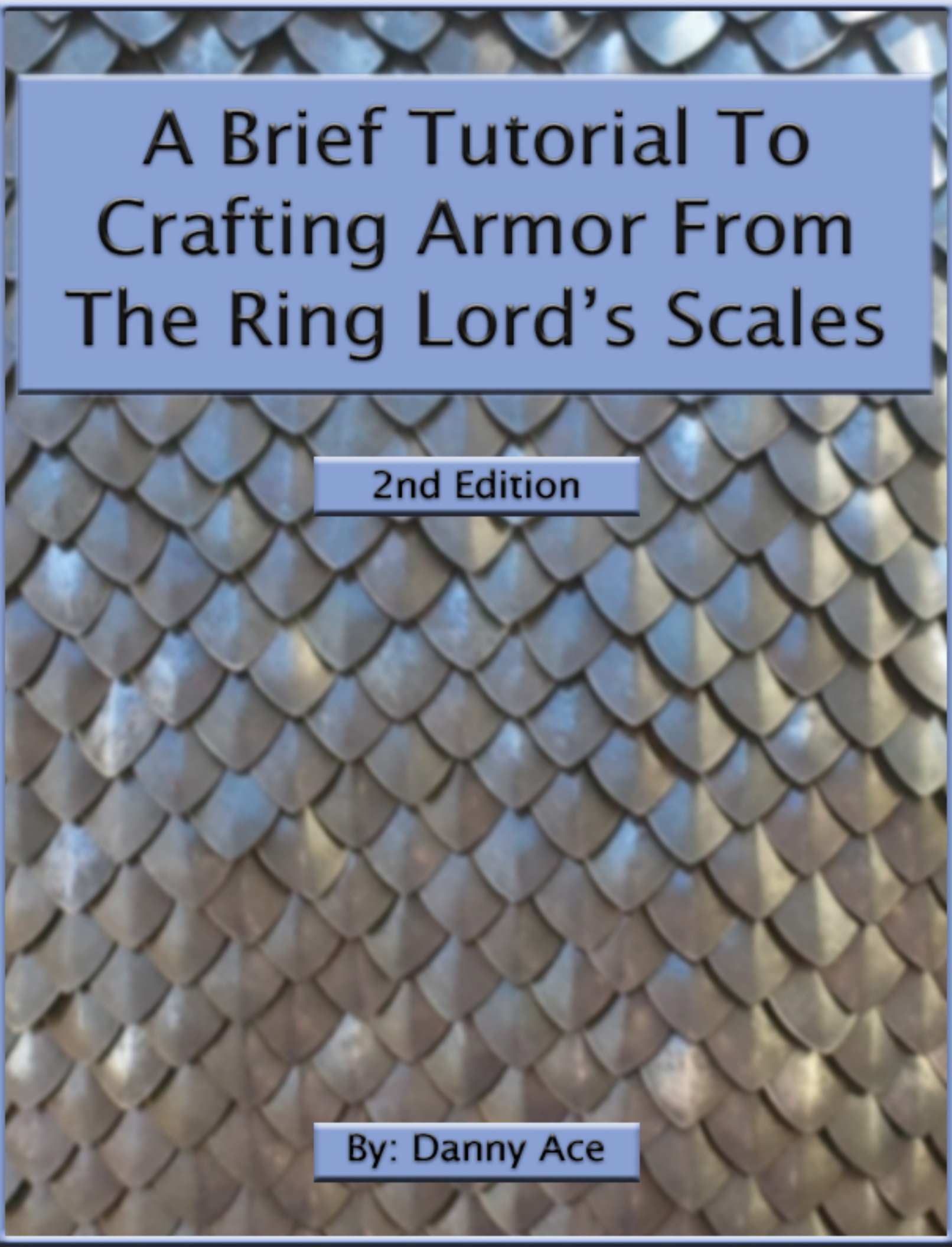

A Brief Tutorial To Crafting Armor From The Ring Lord's Scales
2nd Edition
By: Danny Ace

Please Read This First!

As I stated in the previous edition, I am not an employee of nor in any way affiliated with The Ringlord. Not all of the techniques presented herein are my own and I do take care not to represent them as such. This document is meant to be a quick start guide to aid a beginner in designing and weaving their own simple byrnie from The Ringlord's scales; thus it does not cover the additional headaches one encounters on more ambitious projects. I also assume that you, the reader, have at least a passing familiarity with the techniques and terminology involved in the weaving of mail. Lastly, this guide is offered as is, free of charge, take it or leave it, to disseminate hard earned skills and help save other, more experienced craftsmen from answering the same basic questions over and over again. I do freely give permission for others to post and/or host this document as they wish so long as it remains unaltered and is not passed off as one's own work. So to sum up, lets all play nicely together so we can keep the lawyers away, okay?

Why an updated edition?

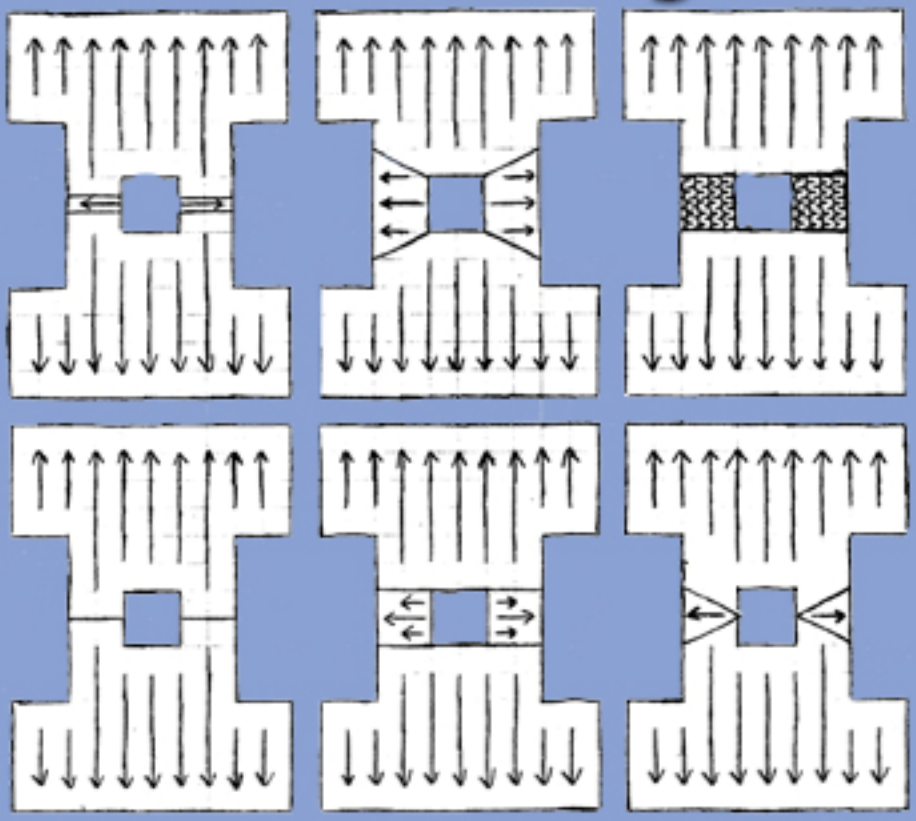
I created the first guide as I was finishing my first scale byrnie, and it represented most of what I had learned up to that time. I have since crafted more scaly pieces and have learned new and/or better techniques to pass along. Also, I wished to correct a couple of errors and mistaken assumptions I made in my earlier tutorial. Let me make this clear however: I do not claim to be the ultimate authority on this matter. Others have created more complex pieces than I have, more polished pieces than I have, and many, many, more pieces than I have. Most in the community are pefectly willing to offer advice and aid. Some focus on armor, some on costuming, and others on jewelry. Though this guide concentrates on armor, the techniques shown on the following pages apply to all of the above. I do hope this document serves you well in your endeavor and expect to see your creations in the galleries soon.

Danny Ace

Choosing Your Weave

There are several ways to weave the scales together. The easiest methods are pictured above. Examples 1 and 3 use the standard weave: two rings per scale, and 300 large scales or 1000 small scales per square foot of coverage. Examples 2 and 4 show the 4in1 weave: 3 rings per scale, approximately 396 large scales per square foot. I have not created anything with the small scales, so I cannot give an accurate count. Also, I have been told the small scales do not work as well with the 4in1 weave. Those numbers do assume you are using the recommended ring sizes TRL lists on their website. Most prefer the standard weave with split rings; less weight, lower materials cost, and faster assembly. 4in1 does work well with butted rings, results in a somewhat tighter looking weave, and lessens the total range of expansion and contraction in a panel of scales. I have tried both of the above methods with the large scales and found each have their own uses. Below are two byrnies. The aluminum one on the left was done in the standard weave with split rings, the hardened steel one on the right done in 4in1 with butted rings. They also use different patterns; a single row 90 degree link, and a 45 degree link. Patterns will be covered next.

Choosing Your Pattern



On the left are six of the easier designs to execute. They are: Single-Row 90 degree link, Trapezoidal 45 degree link, Mail link, Back to Back link, 90 degree panel link, and Triangular 45 degree link. There are many more; even a mantle top byrnie is possible.

The techniques required for each of these will be detailed later.

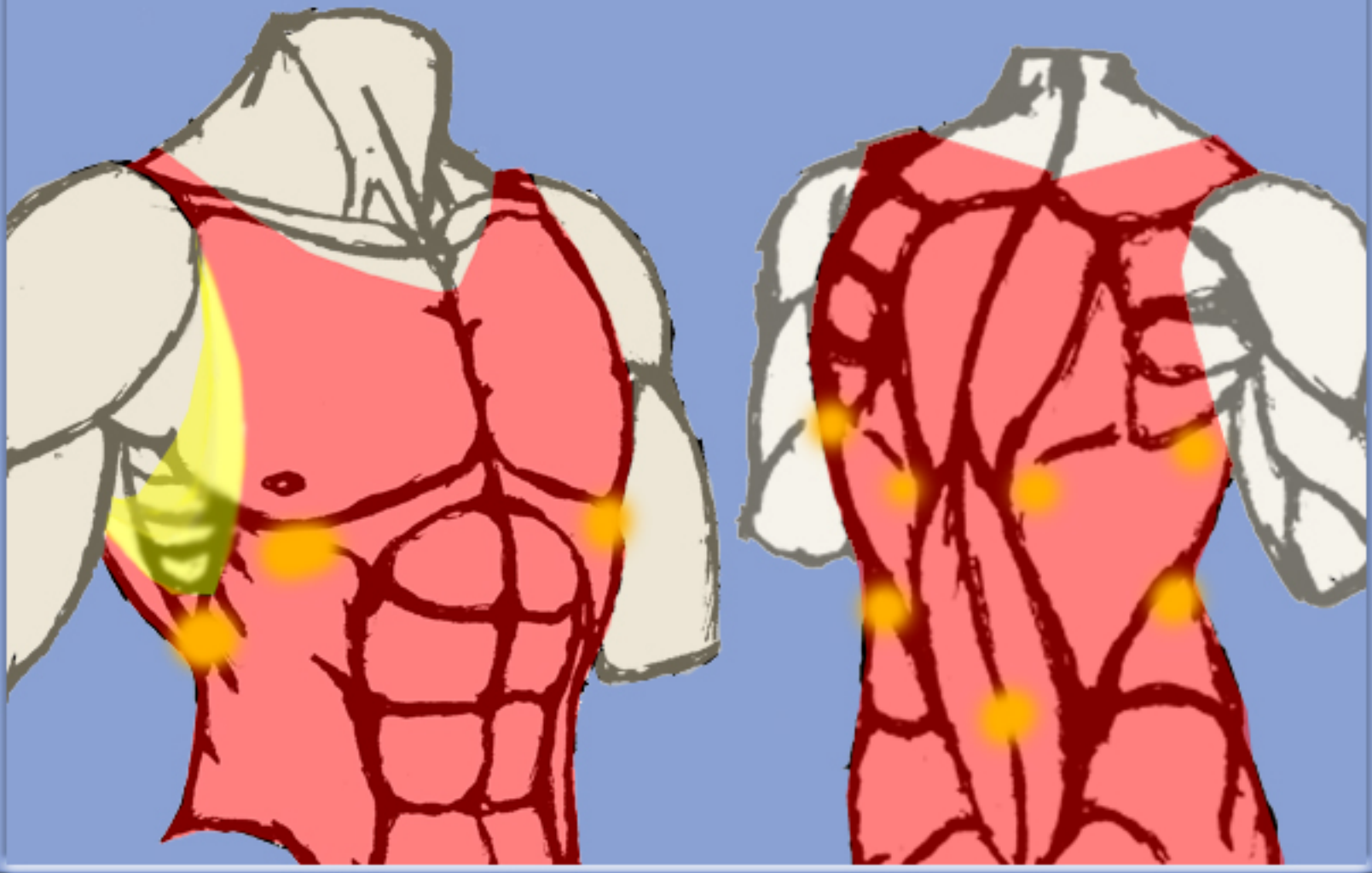
The headless man sketched below is meant to show the approximate placement of seams for each of the above patterns. The red rectangle represents the multi-row 90 degree and mail links, the yellow rectangle for the single row 90 and back to back links. The red trapezoid and yellow triangle cover the 45 degree links. Each pattern has a somewhat different feel and its own set of quirks, none of them are really any better than the other.

Everyone has their own favorite method and the debates over their merits can be endless.

You will just have to go through a bit of trial and error to find your own best pattern.

Perfecting The Fit

I am assuming you know the basics of measuring yourself for clothing. The same measurements apply here but there are a few extra things you should know. The narrowest part of a pullover shirt must be able to fit over the widest area of your body, which is usually around your chest. A sheet of scales expands horizontally while it contracts vertically; make the shirt just large enough for the scales to hang at full extension with whatever you will wear underneath. Divide the circumference of your head by three for the **minimum** size of your neck hole. Hold your arms straight out in front of you and measure between them on your chest. This is normally as wide as you want the panel of scales on your upper chest to be until you get below the point where your deltoid, biceps, and pectoral muscles meet. The edges of the arm holes should usually lay somewhere within the yellow band as shown on the sketch on the left. The orange dots show areas where you may want to weave in contractions, which will be detailed later.



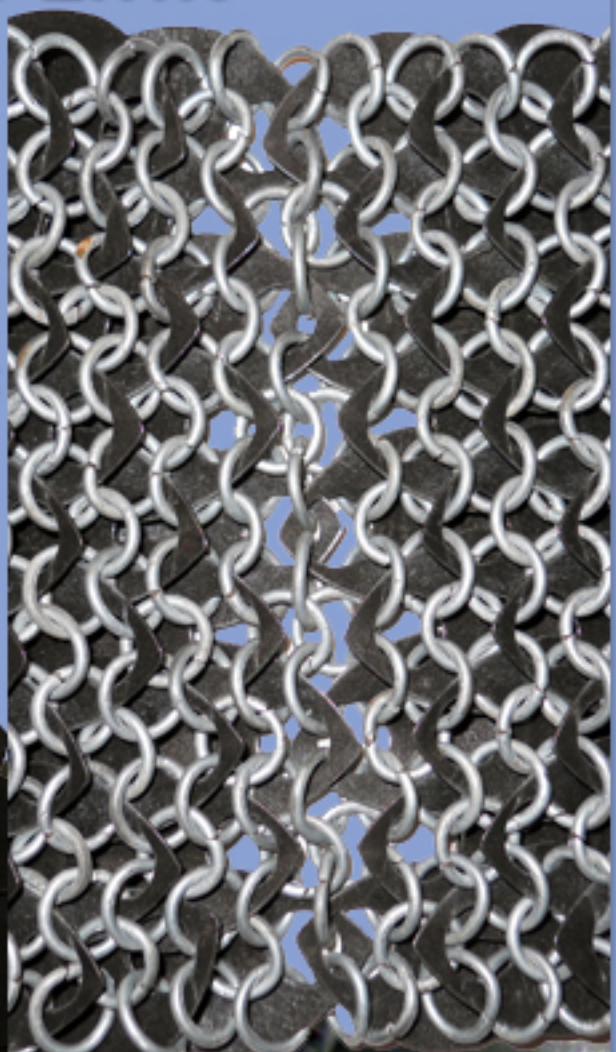
Working With Split Rings

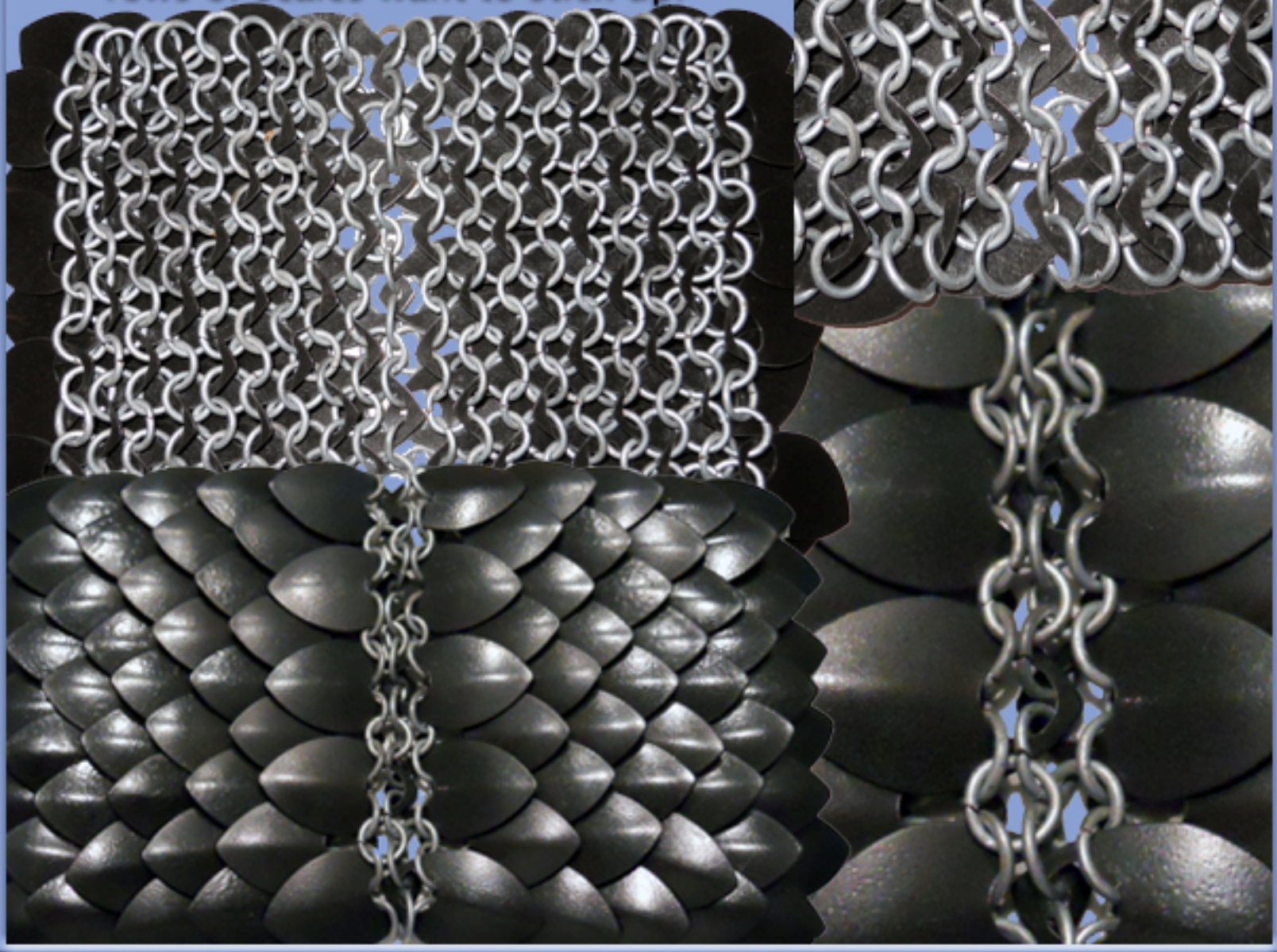
Split Rings can be a little hard to understand at first. It helps to see the rings as 'right' or 'left' only in relation to the new scale you are attaching them to. I will explain why. First, I recommend using the pliers pictured here. It does speed matters along to have a large number of scales 'preloaded' with rings as shown on #1. Also note that the coil runs clockwise from top to bottom on these particular rings. This is important because you have to maintain the same orientation between the ring and two scales. The right lower ring on scale #1 will become the left upper ring on the next scale down on the right (#3), the lower left ring becomes the upper right ring for the scale down on the left (#2).

On the 'new' upper left ring for the right scale (#3), split the bottom of the coil and slip it across the right side, up through the hole and over the top of the left side. For the 'new' upper right ring of the left scale (#2), bring the ring under the left side up through the center and split the top of the coil over the right side. The two pictures on the bottom show the rings pulled halfway through. If your rings were wound counterclockwise top to bottom your upper left ring would go under the right side of the scale, up through the hole, with the top of the coil split over the left side. For the upper right ring you would split the bottom coil over the left side, come up through the center and over the top of the right side. There are other ways to do it, so ask around if this doesn't work for you.

Technique
Back To Back Link

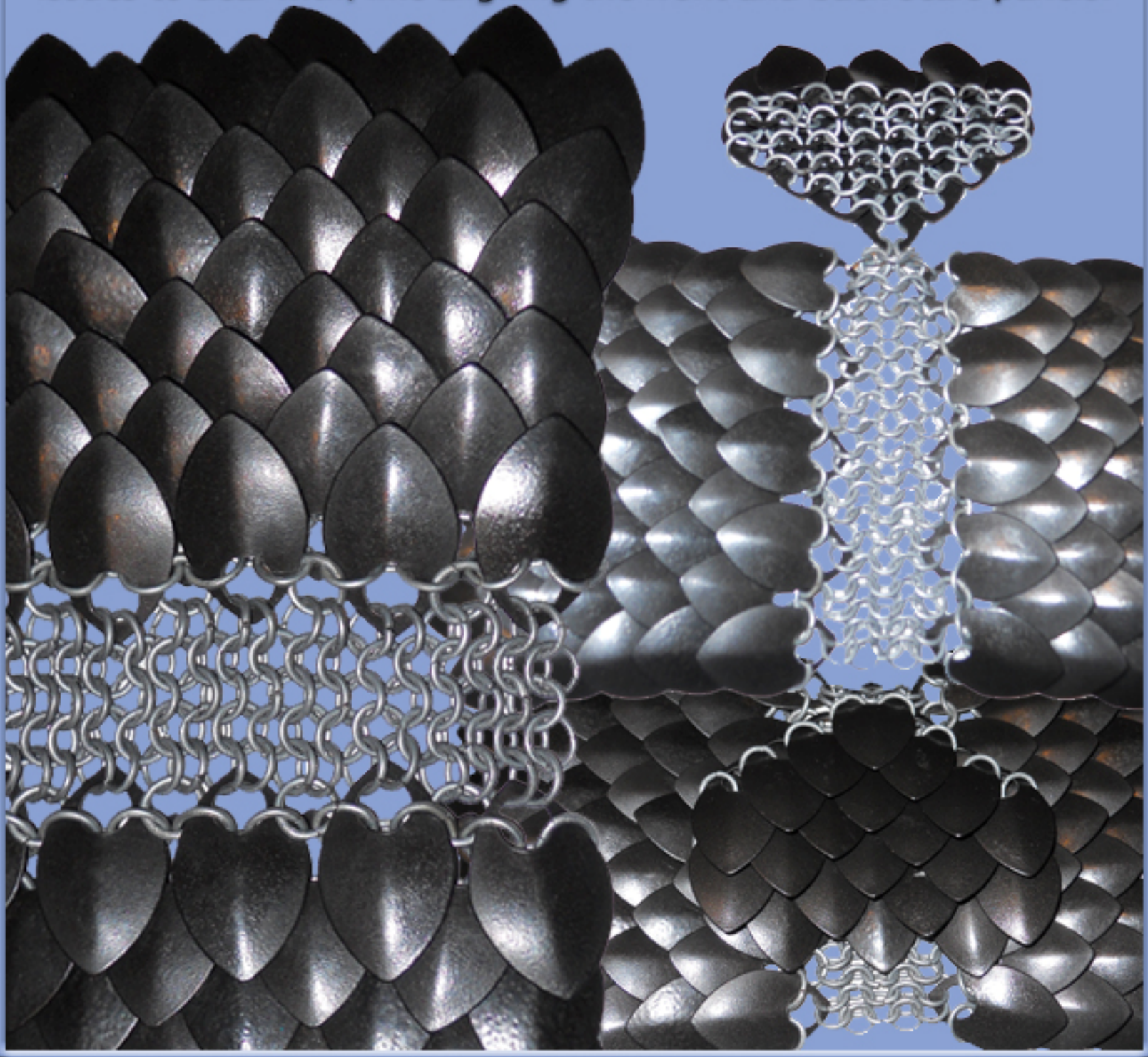
This is probably the easiest way to join the front and back panels of your armor. Simply overlap the scales and slip a ring between them. You can have all or part of one side laying over the other or stagger them as shown. Even if you are not using the 4in1 method pictured here, you might still want to consider weaving the 'extra' rings along the top rows to help shore up the seam. The main drawback to this method is that sometimes the first few rows of scales want to stick up.





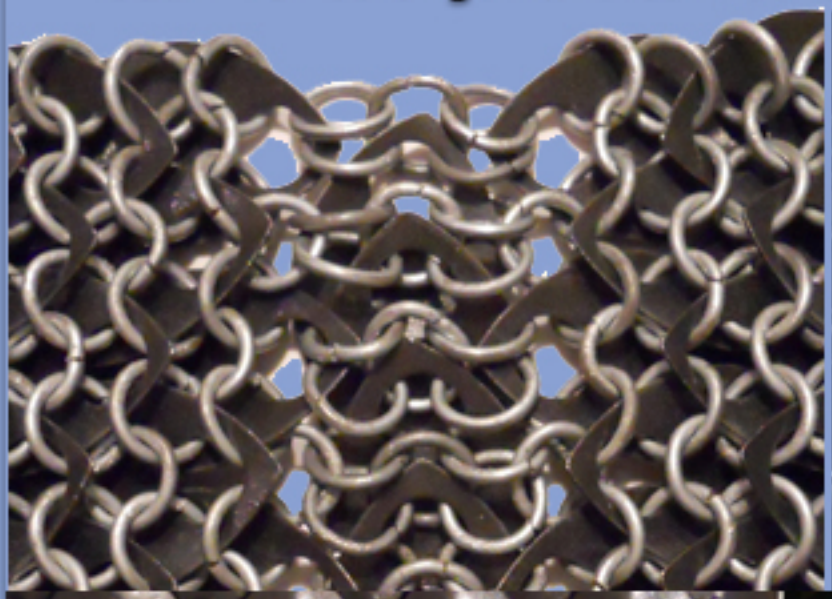
Technique
Mail Link

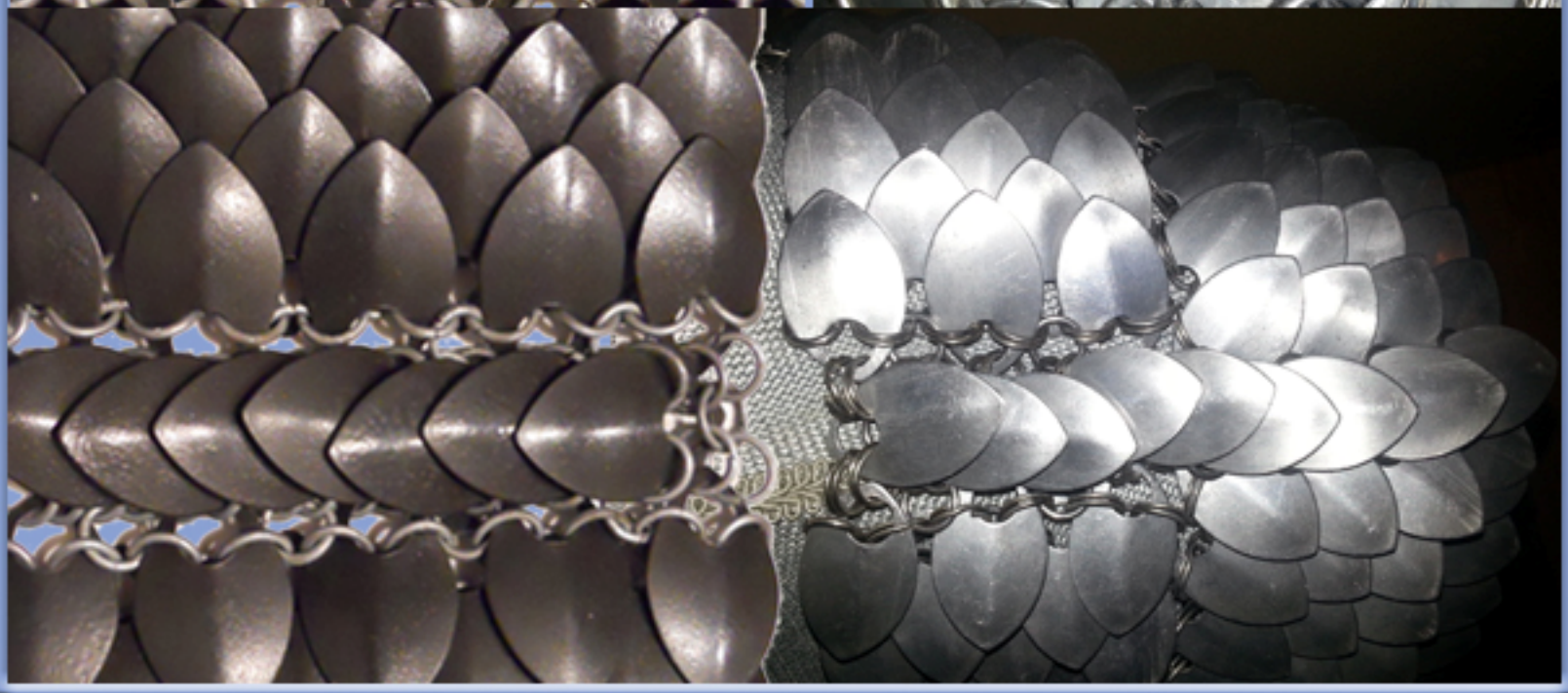
Another easy one to execute; two rings go through each scale. As with the Back To Back method, I like to add the 'extra' rings along the top row. You can also attach spaulders to the mail panels and drape them over as shown below on the right. This pattern has been done with the mail panel 'hanging open' before, which does make attaching spaulders a bit easier, but leaves you with other issues to deal with; like aligning the front and back scale panels.



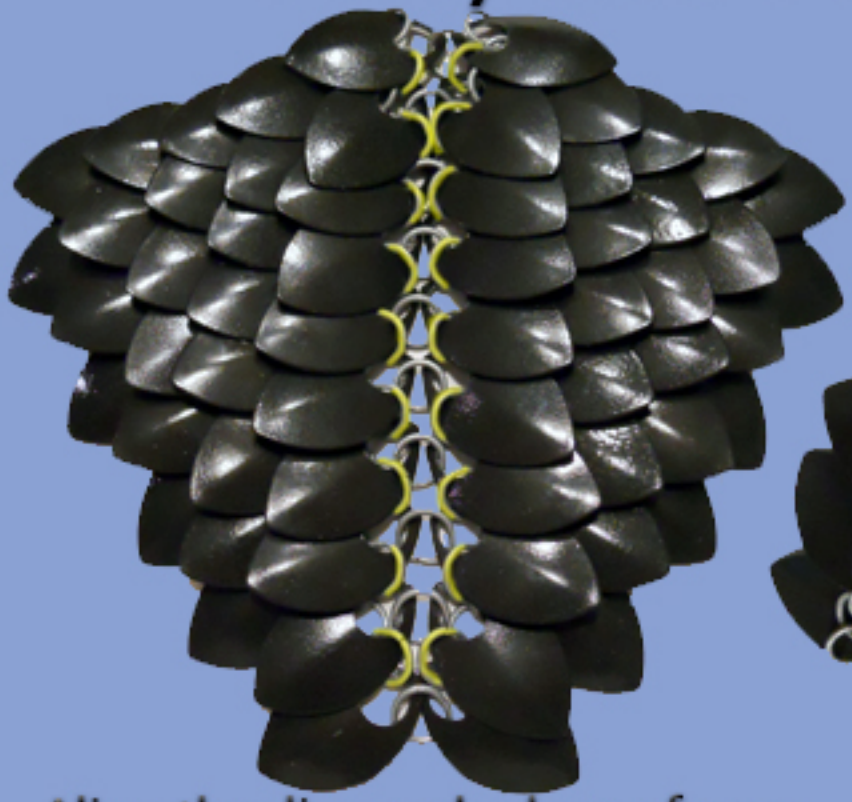
Technique
Ninety Degree Links

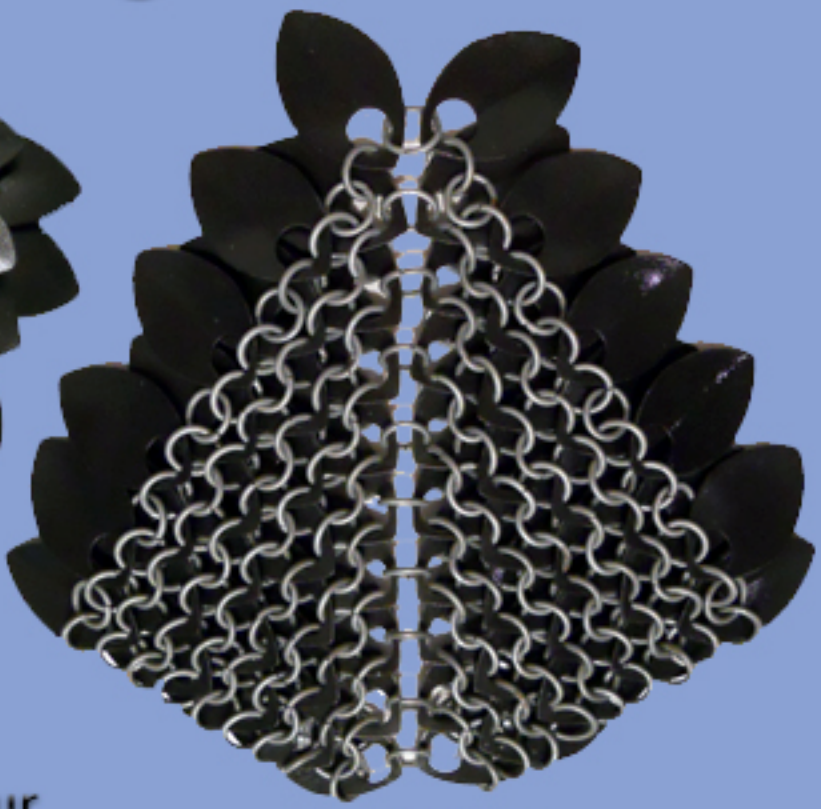
Whether you do a single row or a panel, there are two ways to execute this link. The method on the left results in a tighter looking seam. Since each scale is attached to the lower ring of one scale, and the upper ring of another, it could require extra support or else some scales might try to stick up under load. The method on the right results in a slightly wider looking seam, but can usually take a heavier load unaided as both rings attach to the same two scales. If you are doing a single row link as pictured, you may want to weave that row as a full 4in1 and use the extra rings on the edges of the seam for strength and to insure that the panels hang nicely.



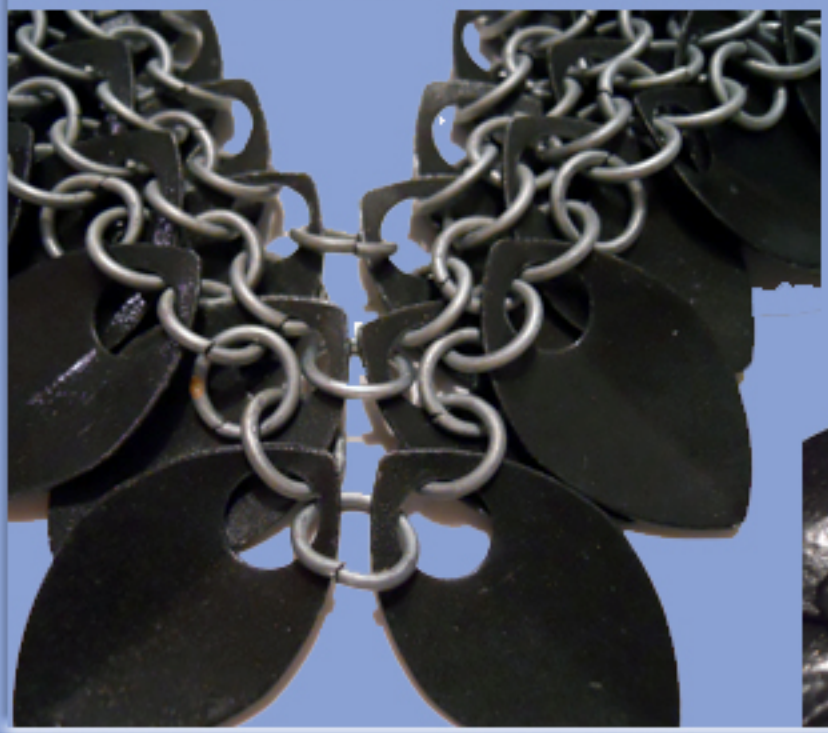


Technique
Forty Five Degree Link

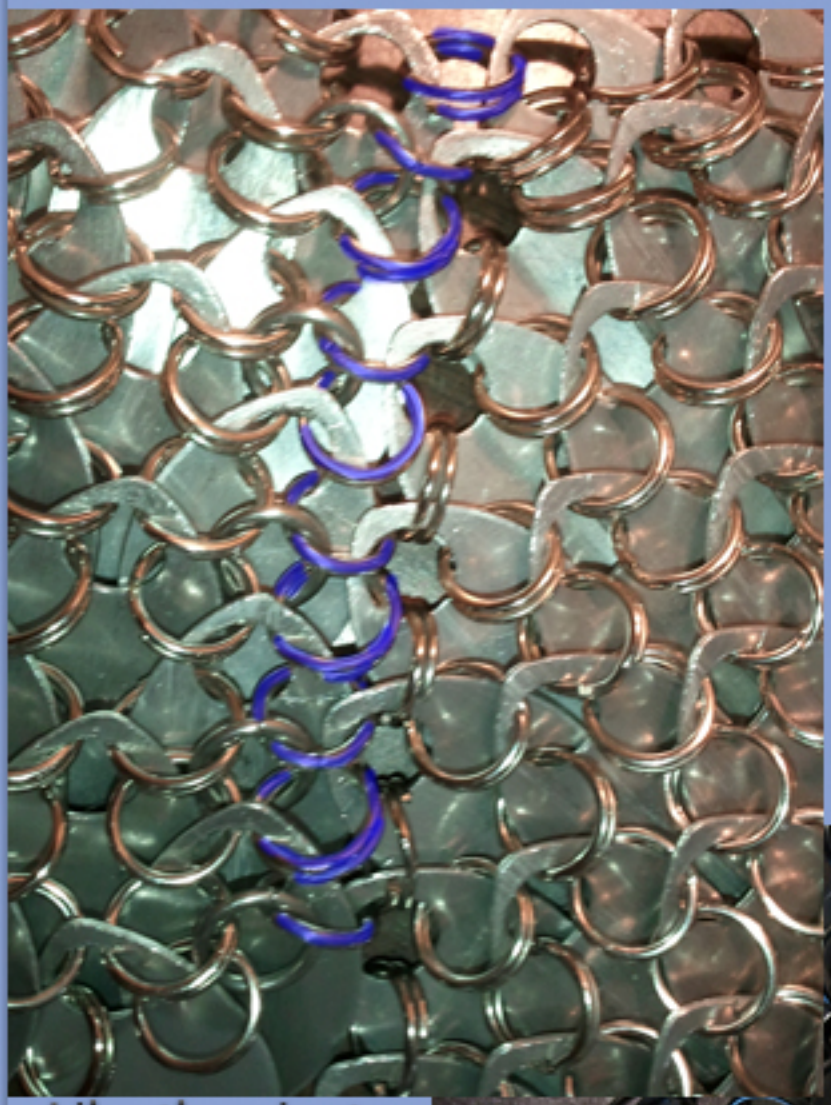




Align the diagonal edges of your panels and slip a ring through the matching scales. You can cover over the seams by attaching extra scales to the rings marked in yellow as shown above and on the right.



Technique
Attaching Vertical & Diagonal Edges

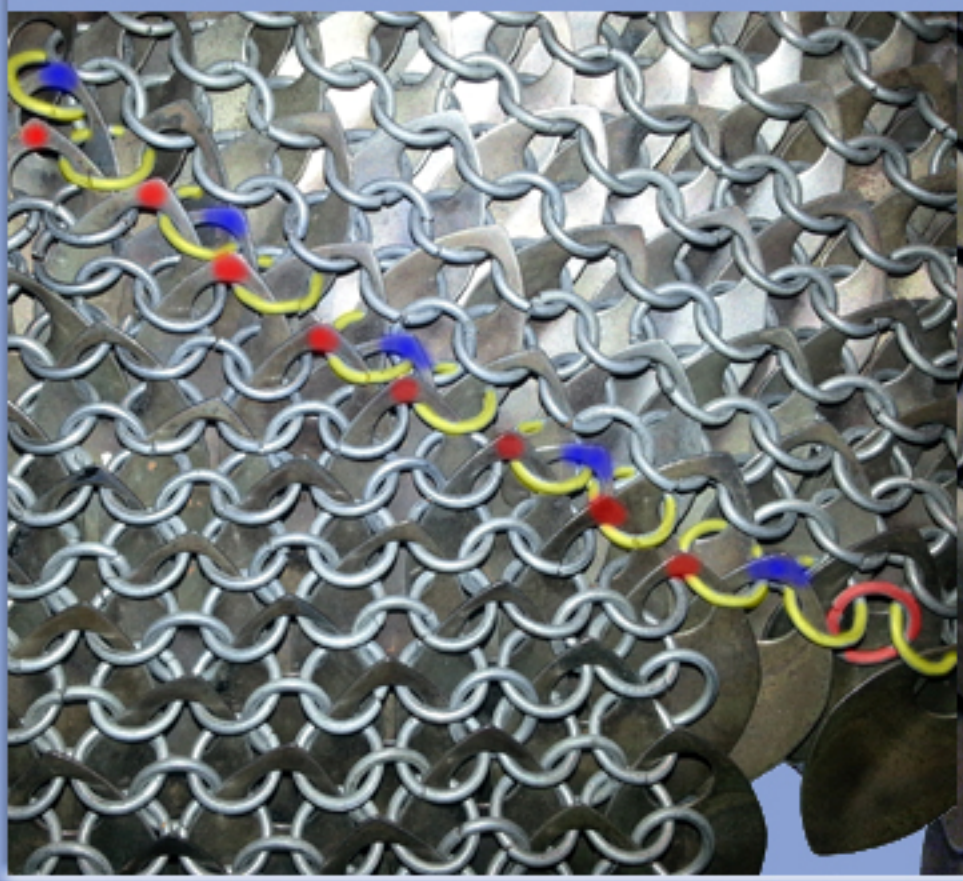


It is also possible to attach a diagonal edge to a straight edge. Simply attach the lower ring of your vertical panel onto the matching diagonal scale, where it serves as the top ring. On the next scale down your vertical row, attach its top ring to the same scale, so it becomes a bottom ring. Do this down the entire row. Your diagonal scales will have five rings passing through; three from their own panel, and two from the other.

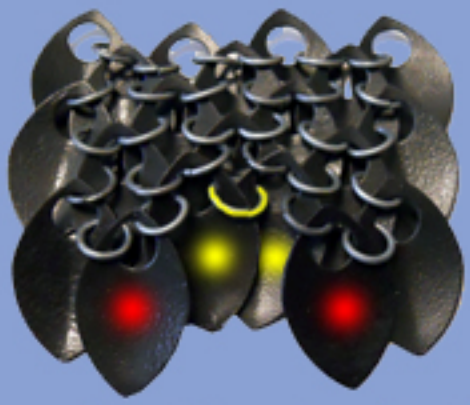
Like the ninety degree link, you can also shift everything up a ring, so your diagonal scales attach to both rings of a vertical scale, rather than one above and one below.

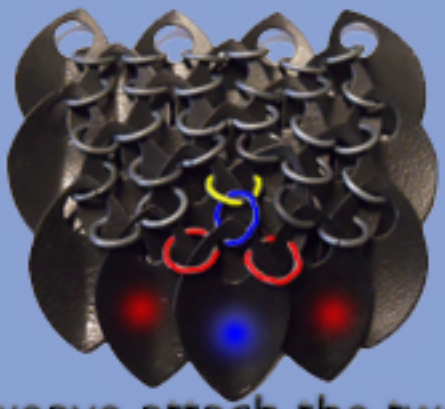
Technique
Attaching Horizontal & Diagonal Edges

You can also attach a diagonal edge to a horizontal, straight edge. The rings marked yellow are the upper rings of the last row of scales tipped with blue on the straight edge. Those rings link each diagonal scale marked with red down the row. The diagonal scales along the seam will have four rings going throught them; three from their own panel, and the fourth from the straight panel. Note the single ring marked in red. Though these panels were woven as a 4in1, you do not want the 'extra' rings along the seam. If the diagonal panel was continued onwards that red ring would be removed. There is a bit of 'slop' at the seam as seen from the front view on the right. This is mostly due to the scales at the seam being doubled up on a connecting ring and laying over each other somewhat crosswise. Nestled within a large panel of scales, the transition is normally not so obvious as it seems in these pictures.

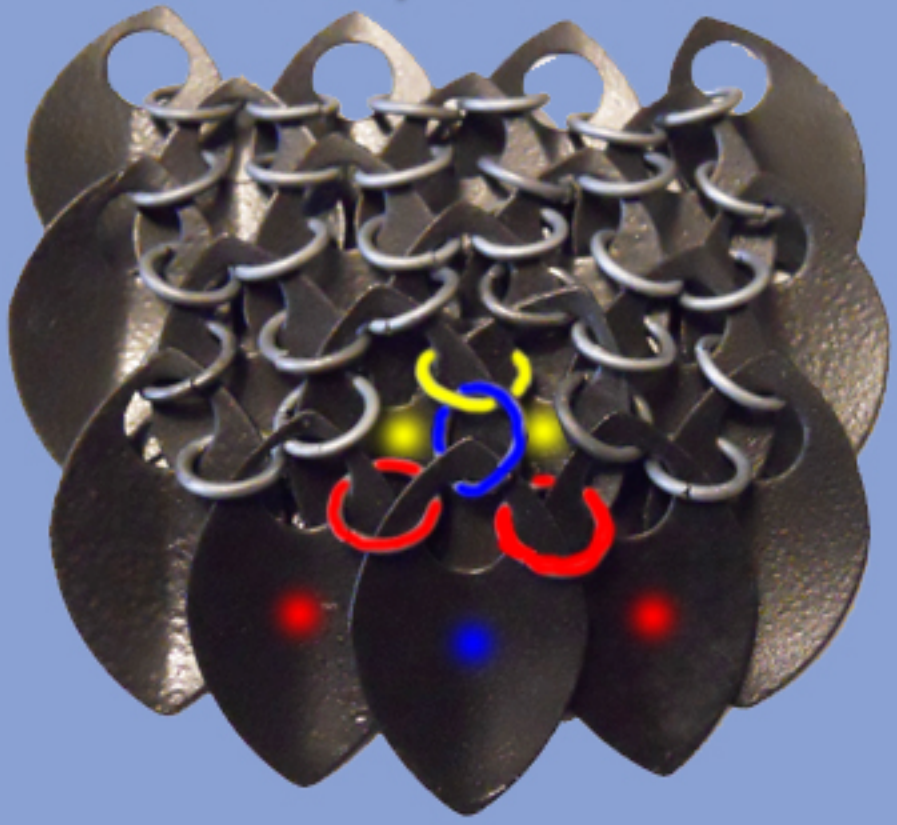


Technique
Contractions: Standard Weave

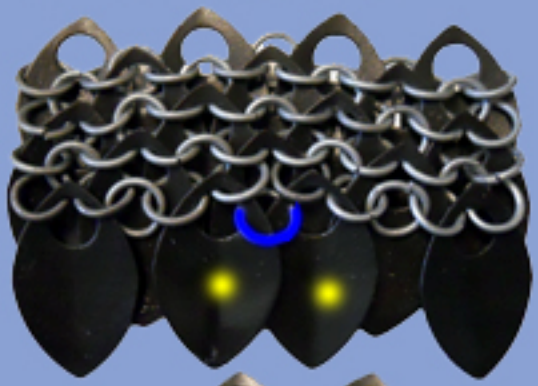


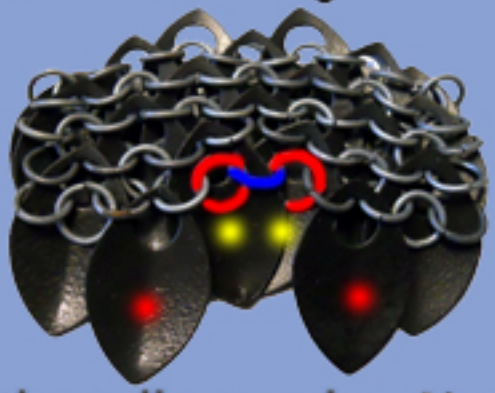


To execute a contraction using the standard weave attach the two scales marked in yellow together with a ring, also marked in yellow. Next, slip a scale onto a ring (both marked blue) and link it to the yellow ring. Finally attach the scales marked red to the blue scale. A close up of the contraction is shown below. You can place multiple contractions fairly close to each other without making the weave appear 'messy'. You can also vary the size of the 'blue ring' a little bit to cause the scale to lay higher or lower in the weave as necessary. If you happen to be using the 4 in 1 weave, contractions are handled a little differently. One is shown on the next page.

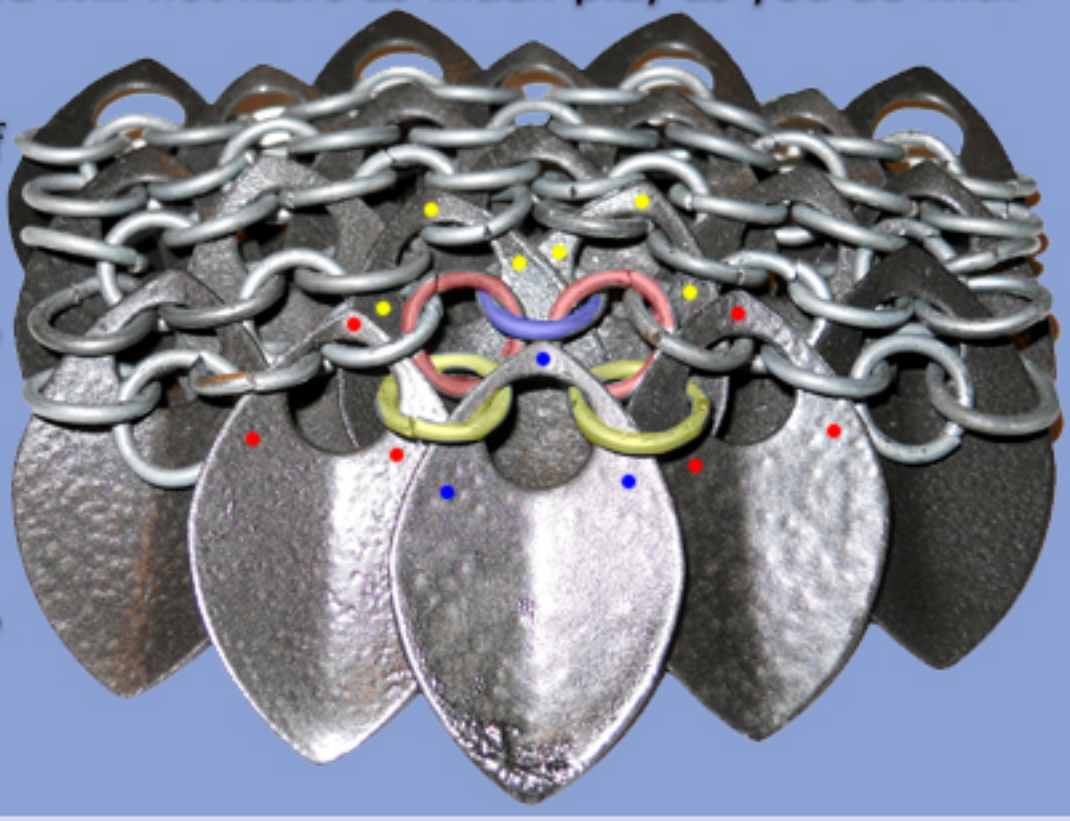


Technique
Contractions: 4 In 1 Weave





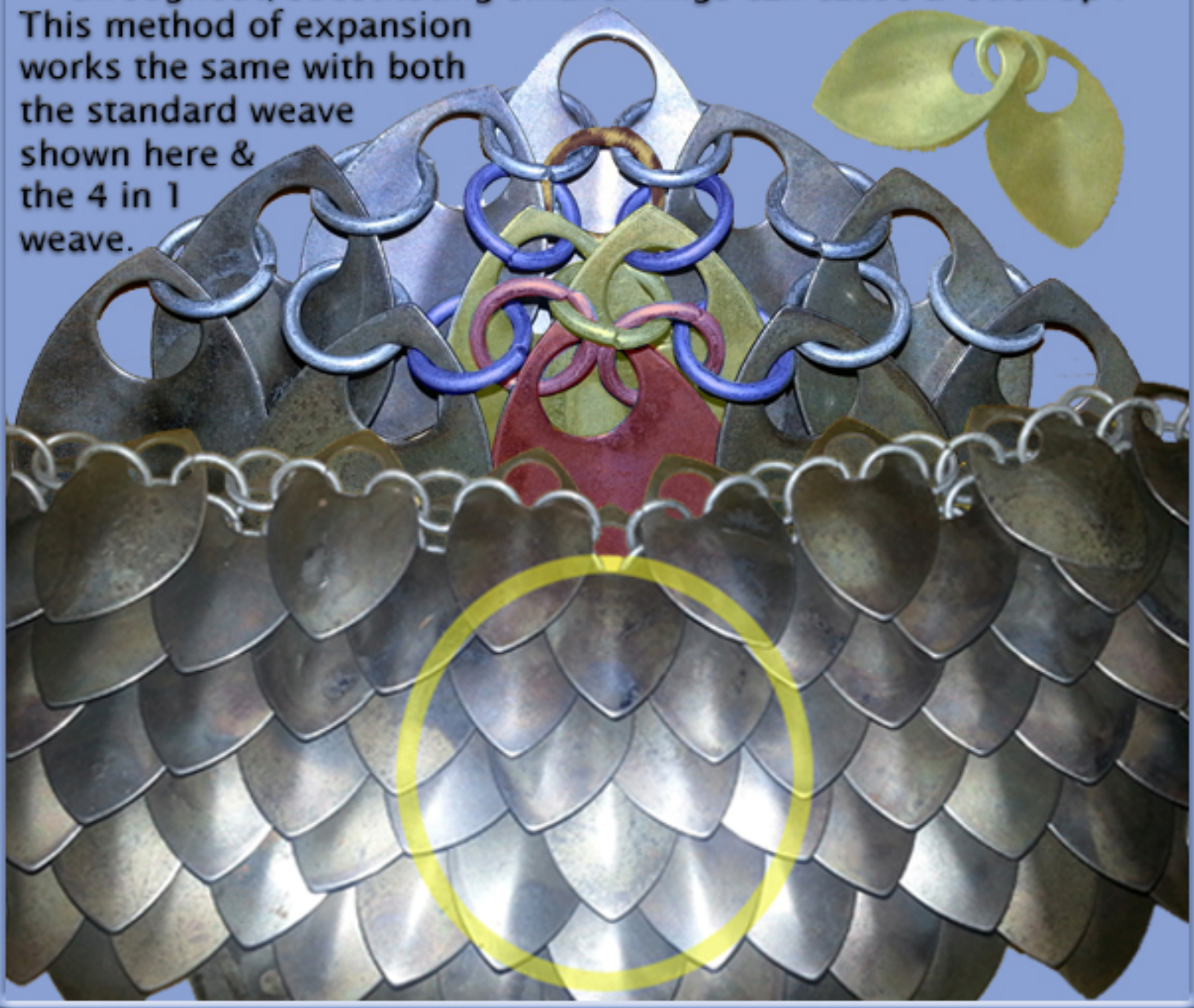
Attach the two scales marked yellow with a ring marked blue. Add your next row of scales until you get to the linked pair of scales. Slip the rings marked red through the blue ring and the rings attaching the red scales to the yellow scales. Next attach the rings marked in yellow through the red scales and rings onto the new blue scale. The red rings will go through a total of three rings and the yellow rings will go through two scales and one ring. You will have five rings between the red scales. You will not have as much play as you do with the standard weave contractions. Increasing the size of the yellow rings will allow the blue scale to hang a little lower, but I have never needed to. Using smaller rings might cause things to bunch up. Otherwise, this works exactly the same as the standard method.



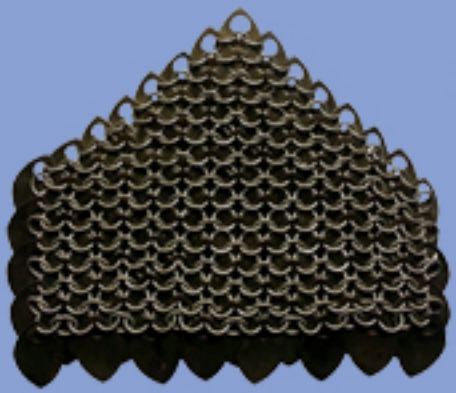
Technique Expansions

At the point where you wish the expansion to begin, attach two scales together as shown in yellow on the right. Treat the attached pair as a single scale and link it normally as shown below with the blue rings. Next slip rings through a new scale (all colored red), the ring linking your pair (yellow), and the two lower rings (blue) that secure the pair in the weave. The leopard spotted ring keeps the top rings (blue) of the attached pair hanging neatly and helps prevent gaps. It is best to stick to the recommended ring sizes throughout; substituting smaller rings can cause a 'stick-up'.

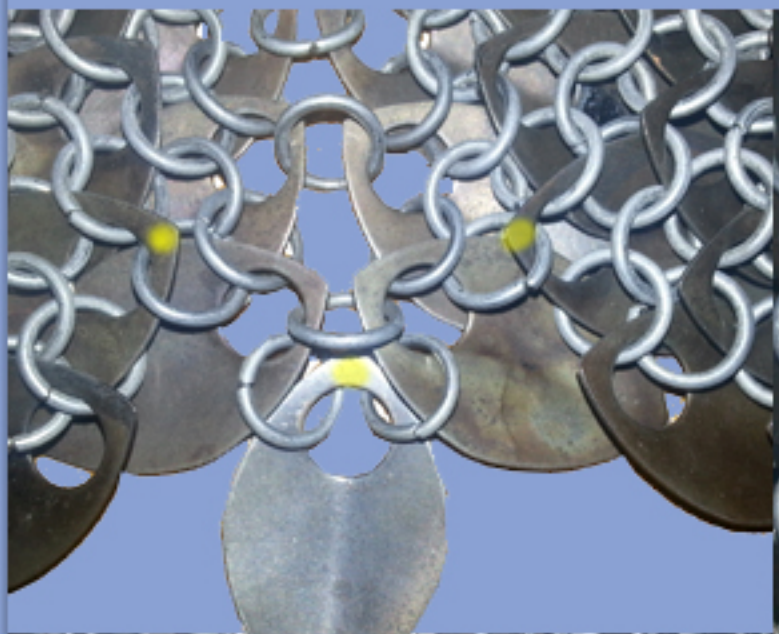
This method of expansion works the same with both the standard weave shown here & the 4 in 1 weave.



Technique
Creating A Cupped Form

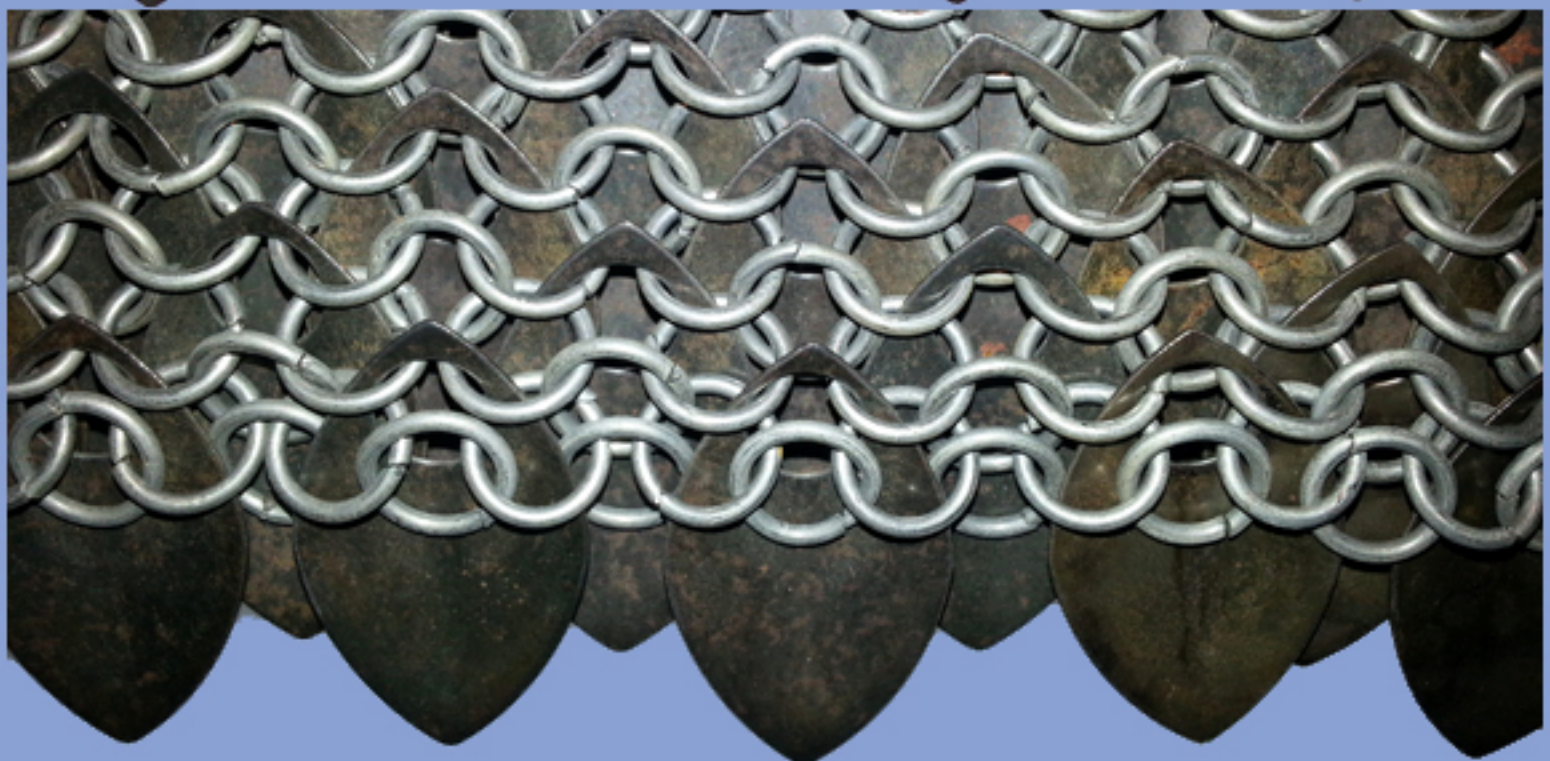


Start with two or four triangles and add the extra rows. Attach the diagonal edges using the forty five degree link. Add a new scale to the last diagonal scale and the scale directly underneath it as shown below. You will continue to attach the two edges to new scales along the entire row. Laying flat, it will seem to become a tangled mess as you work your way down. Once it is draped over a rounded form, everything will hang neatly. The yellow marks on the two close up pictures indicate those scales are on the same row. You can create a cupped form using contractions as well, but this method results in a much deeper, bowl shape. A half-circle shape made using two triangles can be woven onto a flat sheet using either of the straight edge to diagonal edge links shown earlier.



Technique
Finishing Edges

The left picture shows a panel with 'unsecured' scales on the edges. They will not lay neatly with real world use. The right picture shows two methods of finishing the edges. The left side of that picture is how to edge the standard weave. The right side shows how to edge the 4in1 weave. You can also slip a ring through the center rings and the scales underneath (in yellow) for extra hold. The last picture shows how you can keep the bottom row of scales hanging neatly.



Combining Techniques

Looking at the picture below; this is the top of the right shoulder of the aluminum byrnie shown earlier. It was woven in the standard style using split rings, except at seams and certain other stress points where I added butted steel rings for extra strength and/or stability. So, I've used the 4in1 weave in certain areas alongside the standard weave. Several different techniques were used to create the shoulder as well. You see a single row ninety degree link on the left side. Looking farther to the right, you see the spaulder is attached using the vertical edge to diagonal edge technique. The spaulder itself is a cupped form using two triangles. The forty five degree seam in that cupped form is covered over with scales that I've lined up with the ninety degree link to make what appears to be a single, uninterrupted row of scales between the two. As you become more comfortable with the basic shapes and forms, how they work and how they feel, you will begin to imagine many inventive ways to combine them and make something truly unique.

Failure:
Always An Option &
Always An Opportunity

The two pictures show my experiments for creating a mantle-top style scale byrnie. I didn't like the long transition seam on the example in the top picture. The bottom one is actually half of the next mantle I wove. I learned the hard way that I had too many expansions worked in; that 'half' easily forms a whole circle, and it caused me problems further down the torso. The point is: if you have made a mistake, and you probably will, do not be afraid to tear out and redo your work. It may seem like a heavy price to pay, but a well made and fitted suit of armor is priceless. Sometimes it is better to start over again instead of trying to 'make it work'.

Some Miscellaneous Tips, Tricks, & Advice

Keep the loads running vertically along the panels of your armor as much as possible. The scales expand horizontally and contract vertically. This means that if a panel is under heavy load from the side or on the diagonal, the scales will want to draw in and the ends will want to stick up. You might find this happening with your 90 degree panel or 45 degree trapezoidal panel patterns. Balancing the loads and/or providing additional support can alleviate this. Using the hardened steel shirt in the beginning as an example, the mail collar and the weight of the sleeves keep the scales along the sides of the neck laying flat despite them being pulled more heavily horizontally across the weave at that location.

Use vertical and diagonal lines around your neck and under your arms as much as possible. A straight, horizontal row of scales will want to sag without support from above.

If you find the scales covering your 45 degree seams do not want to stay in place, you can further stabilize them by adding two extra rings. Slip them through the offending cover scale and through the two rings that the next cover scale down is attached to and so on along the line. This will keep them straight but they will stick up just a little bit.

The panels of your armor do not have to be perfectly symmetrical. For example, having the back a few rows wider than the front will camber the sleeves forward a bit; making it easier to reach out and 'touch' someone with your weapon.

If you make use of the single row 90 degree link, the back to back link, or similar configurations, make your neck hole a bit on the wide side. The scales do not flex as well horizontally across the panel as they do vertically along it. You could find them being driven into the sides of your neck when you raise your arms over your head if you do not allow enough room.

And of course...

NEVER GIVE UP!

The End

Hopefully this tutorial has delivered on what I had promised in the beginning. In the previous edition of the guide this is where I wrote about how I designed my first suit and why I made the choices I did in its construction. That was almost three years ago now, and I no longer feel it is necessary. In that brief time the knowledge base and level of expertise, not to mention the number of craftspeople working with this medium, have vastly increased. A fair number of them have blogged and posted their own methods and experiences, collectively painting a much larger picture than I ever could alone. So as my own deliberately mismatched kit below is attempting to illustrate, go find whatever else you want and do as you like with it.