

# Preparation of Quills and Reeds

DONALD JACKSON

When Edward Johnston wrote *Writing and Illuminating, and Lettering* in 1906, he gave directions for *re-making* a 'Turkey's quill . . . as supplied by the stationers' and assumed that 'The nib already has a split, usually about  $\frac{1}{4}$ " long.' Professionally cured and cut pens were still available in London from Henry Hill and Sons as recently as 1956, when the first *Calligrapher's Handbook* was published. We may assume that in the cities of Europe pen-making was, for hundreds of years, a separate, if humble, trade; thus, even the most vociferous of writing masters over the previous centuries seem to have confined their advice on pens to the finer points of re-cutting, nibbing, and trimming them, with hints here and there on how to keep them in good condition. Nineteenth-century literature on the subject emphasizes techniques related to mass production for a huge market. Millions of feathers were imported each year into England alone to be forged into pens by skilled craftsmen. There was little incentive for generations of students or teachers to research methods of preparing and tempering quills. We, however, must now make them for ourselves.

## FEATHERS

The quality of the raw material is important, and wherever possible, try to obtain moulted feathers from mature

birds. The Hudson Bay goose quill was highly favoured in nineteenth-century Britain. This was probably from the moulted feathers of the wild Canada geese, which were retrieved from the summer breeding grounds in the far north, and imported by the Hudson Bay Company. The flight feathers of the wild geese are of excellent strength and resilience and are often clear and hard even before tempering. The barbs of these feathers are usually dark grey in colour. However, for most of us, choice is limited to such domestic goose and turkey feathers as are available from local sources, or from a feather merchant, who may also be able to supply swan feathers.

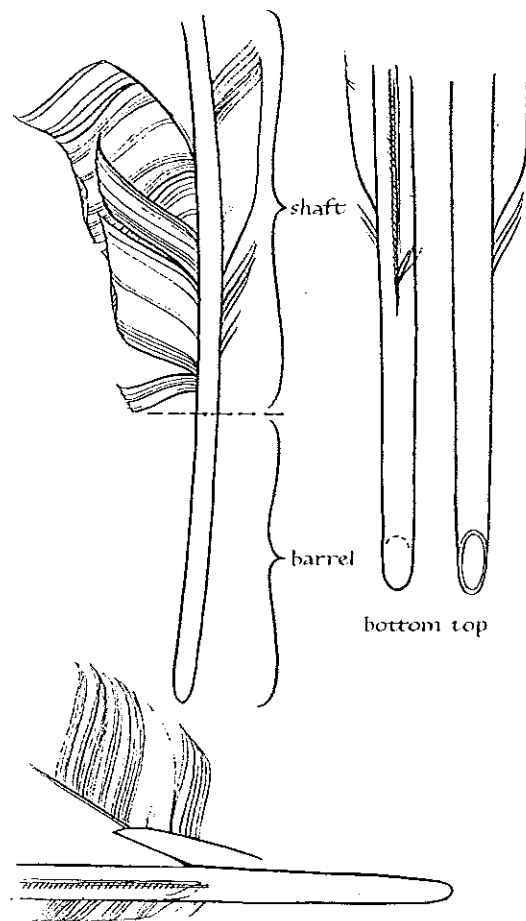
The different species can be told from each other only after examining a number of each type. All three are often similar in colour (white) but, in general terms, the goose and swan differ from each other only in size (the swan being larger), whereas a turkey has a more stocky shape, with a pointed 'nose' and a shorter barrel. The turkey quill also has a thicker barrel wall than most goose or swan feathers, can be had in large sizes and is usually available from a farmer or butcher. Its disadvantages are that because of its strength it can be too rigid for small writing unless specially modified in cutting, and stiffness can hamper the free flow of ink, especially opaque colour or gesso. This can limit the potential for those subtleties which occasional variations in

pressure can impart to the letterforms.

The goose quill's barrel and shaft are more slender than the pen holder most people are accustomed to handling, but the proportionate thickness of the barrel wall to its circumference, provides an ideal balance of flexibility and strength for small to medium-sized writing. So it is worth persevering even though at first the grip is unfamiliar. Swan is of larger diameter than goose, but the barrel wall is not so thick as turkey, thus enabling you to make a wide pen which is naturally flexible. A pen, however, can be made from almost any primary feather of reasonable size and strength.

The three main parts of a feather can be described as: the *barbs* which are each side of the solid *shaft* leading down to the hollow *barrel* from which we cut the shape of the pen (Illus. 1). The quill barrel is a form of albumen similar to our fingernails; the aim of tempering it with heat is to fuse and harden this albumen so that a pen cut from it will be hard-wearing and less likely to soften and distort through prolonged exposure to wet (ink). A quill may harden somewhat with age, but it will not clarify (take on a transparent hardness) any more than a piece of steel will temper itself over the years.

The first five strong flight feathers from each wing are most suitable for pen making. They can be identified by their having a much narrower barb on one side of the shaft than on the other. This is the side of the feather which would have cut into the wind in flight. Swan, turkey and goose, because of their size and availability, are the ones most likely to be useful for general work.



Illus. 1: The parts of a quill. Cutting the end of the stripped barb before it can tear into the barrel wall.

### CURING QUILLS

The following directions for preparing and tempering can be applied with whatever variations you wish. The simple method of tempering with hot sand was developed as a result of work with several classes of students.

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If a dry, raw quill is placed in hot sand, it tends to become opaque and milky in appearance. The requisite concentration of matter (fusing) does not seem to occur and a slit made in such a pen is often ragged and unworkable. It appears that the minute cells must first be expanded by moisture before they can be shrunk, like cotton cloth.

There are ten stages:	Seconds
1 Cut off the end of the quill barrel.	1
2 Soak in water.	(see below)
3 Remove surplus water.	2
4 Remove internal membrane.	8
5 Prime with hot sand.	6
6 Insert in heated sand.	4
7 Inspect result.	1
8 Re-insert if necessary.	4
9 Empty sand, scrape off the membrane and mould the barrel if necessary.	8
10 Test for consistency when cooled.	4
Approximate timing when reasonably skilled	38 seconds total.

1-2 To prepare the pens for soaking, first cut off the sealed end of the barrel at a slant (Illus. 1), to allow the water to penetrate to where the shaft begins. You may soak as many as you wish, but take out only as many quills as you intend to temper immediately, or they will dry out and need re-soaking.

The raw quill barrels should therefore be soaked in water for around 12 hours, though 1 hour makes a considerable difference to the pliability of the quill, and can produce

a distinctly clearer result even at this early stage.

3-4 Shake the surplus water from inside the barrel and hook out the membrane which you will see inside it. A crochet hook can be adapted to this purpose, or a straight length of metal coat-hanger or bicycle spoke; try to avoid scratching the inside of the barrel because this may damage the ultimate writing edge.

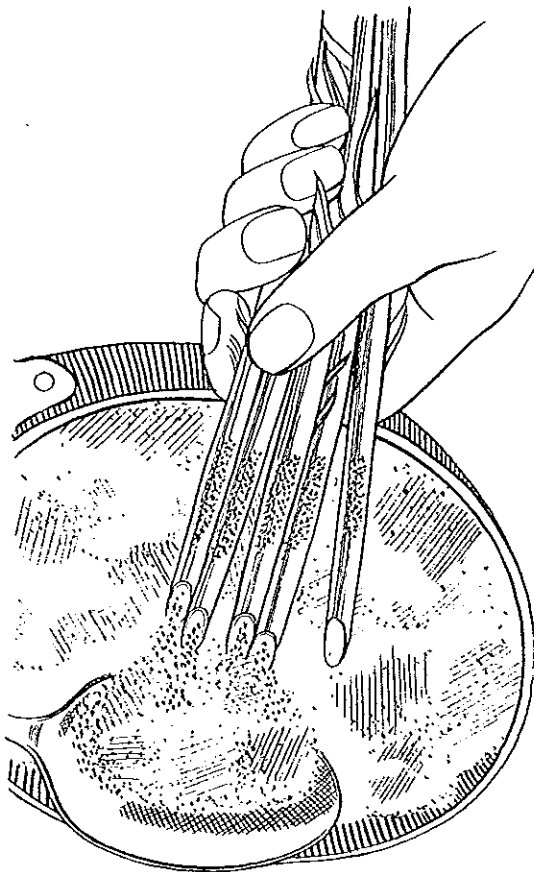
The barrel should now be soft, pliable, free from excess moisture, and have no obstruction within it, caused by the remnants of the membrane, and it is ready for tempering.

Fine silica sand should be used, such as potters use to line a kiln, sometimes called silver sand. The finer the sand, the more efficient the transfer of heat to the quill since there is less space for air in between the separate granules. The sand may be heated by a variety of means, camping stove or gas cooker, for instance, or even a thermostatically controlled electric frying-pan. Any heavy frying-pan filled to a depth of around 50 mm (2 in.) works well as a container.

5 Using a large spoon, prime the upturned quill barrel with hot sand till it overflows (Illus. 2). This will help conduct heat evenly to all parts of the barrel.

6 Thrust the primed feather into the hot sand at a shallow angle, completely covering the barrel up to the beginning of the shaft (Illus. 3). Try not to spill the sand you have already poured into the barrel.

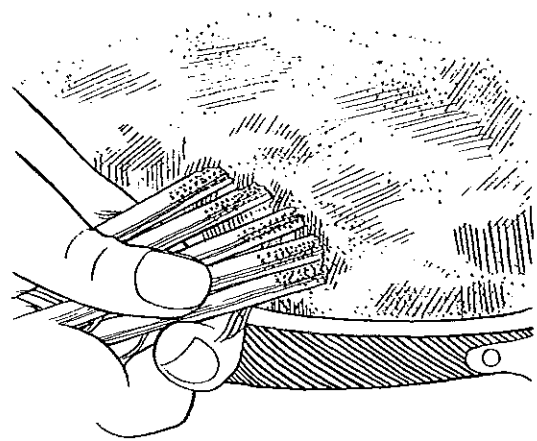
7 After a second or so, remove the quill and examine the result. If the quill is covered in blisters and is distorted, either the sand is too hot or you should have thrust it in and out of the sand more quickly. If the quill remains



*Illus. 2:* Priming soaked quill with hot sand.

rubbery after cooling, even though it may look clear, either the sand is not hot enough, or you may need to leave it in the sand longer.

No specific degree of temperature has been mentioned so far. The test is whether the pen will clear and then harden when cooled, crack clean and straight when a slit is introduced and, in a good-quality goose quill, have a slight 'nicotine' coloured cast to the cut edge of the barrel wall (as glass looks green on its edge).



*Illus. 3:* Plunging the primed quills into pan of hot sand.

If the quill is left too long in sand which is too hot, the albumen melts and the grain of the quill along which a crack would otherwise naturally follow, loses its 'identity'. The pen will be brittle, and the slit will run unpredictably.

In practical operation such as this, learning is not simply a question of memorising quantities, measurements, temperatures or time. Such directions can be misinterpreted and appear to deny the need for individual experiment. It is best to try the process first, test the quill, set the experience against the principles outlined here and then adjust the temperature of the sand and the timing of operations to achieve the required aim.

George Yanagita has been successful with an electric frying-pan set at 350°F. — 60 seconds for turkey quill, or 50 seconds for goose quill. I prefer to have the sand hotter and to temper the pen more quickly — there is no 'only way'. Just as in photography where elements of time and light have to be juggled to achieve a particular result, different grades of feather require different 'exposures' at different temperatures for a particular result.

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- 9 After withdrawing the quill from the hot sand, shake the barrel clear of sand and while it is still soft from the heat, use the *back* edge of the knife blade (which is not sharp) to scrape away the membrane which is on the outside of the barrel. This membrane should peel off easily when warm and soft, leaving a soft, shiny quill barrel underneath.
- 10 To hasten cooling and thus hardening, the pen can be dipped in cold water and then rubbed dry. Only when the knife is tested on the hardened quill will you know for certain that you are using the right combination of heat and time.

### *Detailed comments on each stage:*

- 1 Completely remove the domed end of the quill so that the inner membrane can be removed easily and the sand afterwards allowed to fill up the barrel without obstruction.
- 2 If the quills are left too long in the water, especially in warm weather, they can become putrid unless a little preservative is added to the liquid. The barbs of the quills are subject to moth damage and should be stored accordingly.
- 3 If water is left within the barrel and allowed to mix with the sand, it can prevent the sand from penetrating to the base of the shaft, thus trapping air. When the barrel is plunged into very hot sand, the water evaporates, creating steam, and sometimes the quill explodes!
- 4 Remnants of the inner membrane can likewise obstruct the sand, causing uneven tempering along the length of the barrel.
- 5 The feathers should be held sloped over the frying-pan or other container

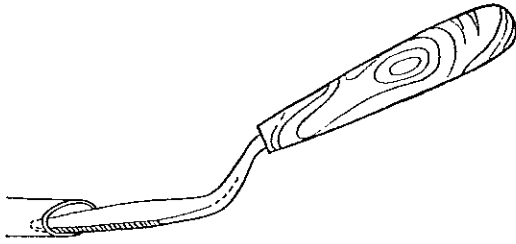
otherwise the surplus hot sand can cascade onto your supporting hand and burn it. I temper five quills at once.

- 6 Once the temperature of the sand is gauged, it is possible to work quite quickly, plunging the quill barrel at a shallow angle into the sand, and with a spoon, scooping and piling up more sand onto it, generously overlapping the base of the shaft. The aim is to temper the quill to an even hardness and clarity along the whole length of the barrel.
- 7 If the quill goes too deep into the sand and therefore too close to the heat source, the tip can shrivel, distort, become too brittle and spoil, but the rest of the barrel may still be in good condition; after cooling, simply cut off the spoiled end. Turkey quills sometimes blister alarmingly when first placed into the heat but this is usually the thick outer membrane which will have to be scraped off anyway.
- 9 Whilst the pen is still soft and warm it can be moulded and flattened with a 'Dutching hook' (to make a wider pen than the natural diameter of the quill barrel would allow), using the method described below.

Norman Brown has adapted an alternative technique for clarifying and tempering pens which is a modification of the method historically called 'Dutching', in which the dampened quills were exposed to heated coals and then scraped and moulded into shape on a hot metal plate under pressure.

Mr Brown mounts a household electric smoothing iron, hot plate upwards, on a bench, soaks the quills in boiling water for 20-30 minutes, presses a soaked quill

against the hot iron with a home-made brass or copper Dutching hook (Illus. 4) which has been heating on the iron, 'twirling the quill slowly till it clarifies and softens'.



Illus. 4: A Dutching hook can mould a warm soft quill.

After testing the reaction of the quill to a high setting of the iron, he gradually reduces the temperature till undue blistering stops. When this 'proper setting' is arrived at, pens can be tempered, moulded and flattened to a desired width at the tip. This process is then repeated on a cold brass or copper plate which rapidly diffuses heat until the barrel sets in the desired shape. He prefers to cut the scoops quickly before hardening is complete, since it is easier to cut a soft warm pen. The slit is inserted later as described in the section 'Cutting Quills' (below).

This method concentrates the tempering on the tip of the barrel, but there seems to be no reason why it should not be extended to include the whole of the barrel as professional pen makers undoubtedly did when they applied a similar principle to mass production in the pen trade.

#### CUTTING QUILLS

Most people start the practice of calligraphy by using a steel pen; at first it seems to answer all needs but after practice and careful study the sense of touch and an

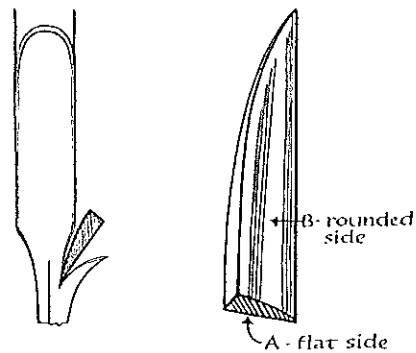
awareness of subtle form develop and there is more readiness to appreciate the value of tools which helped to create the forms of the Roman alphabet still used and adapted in the designs of today. The quill pen is capable of forming a particular but many-shaded repertoire of marks, and through the medium of ink, enables us to transmit fluently and sensitively onto a page images in the mind's eye.

The first thing you are likely to sense when you begin writing with a quill is its lightness, and a new generation of brain-hand reflexes begins to grow. A quill does not need so much pressure to activate ink as a steel pen and, as a lighter touch in response to this develops, hand movements, and therefore letters, can become more free.

A normal quill pen is shaped by making four scooping cuts, three short straight cuts and a slit; a pen knife should be specially adapted to make them.

#### THE PEN KNIFE

The blade needs to be strong but narrow in width and preferably rounded on one face to prevent the cutting edge from snagging as it makes the tight curving scoops which shape the pen (Illus. 5) and flat on the other face to make the straight cuts.



Illus. 5: The knife blade must be shaped for scooping cuts.

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The knife handle ought to be substantial enough to be gripped comfortably between the fingers and palm of the hand (Illus. 8) leaving the thumb free to support the quill and help control the blade's movements. Wooden-handled 'Bench' or 'Chipping' knives such as are at present supplied by Karl Stamm K.G. of Solingen in West Germany or R Murphy of Ayer, Massachusetts, USA, have a reasonably-shaped handle and blade from which to shape a knife for quill cutting.

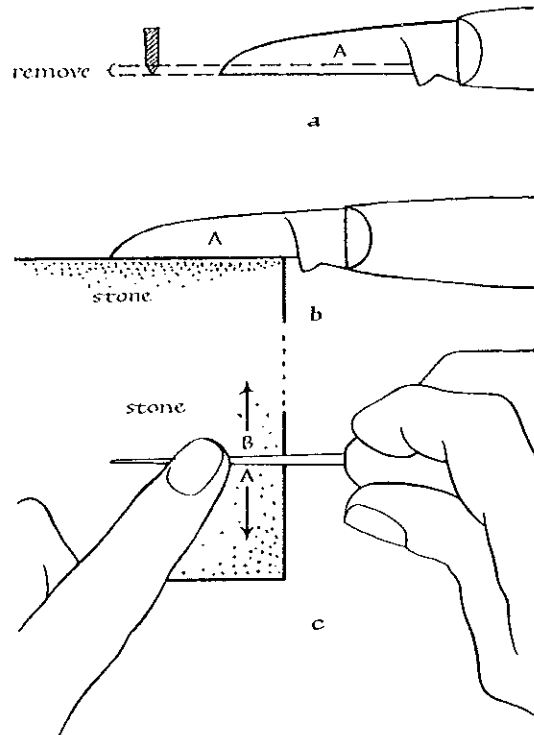
However, since knives are not specifically made for our purposes, we must first reshape the blade to make it curved on one side and flat on the other and then re-sharpen it to give a new cutting edge.

The initial re-shaping is done more quickly on a coarse bench-type India or Carborundum sharpening stone, starting with a coarse and then medium grade (they are commonly available stuck back to back), and moving on to a finer 600 grit silicon carbide ('wet and dry') abrasive paper wrapped round the stone. Lastly, a much finer emery polishing paper (4/0 grade) will provide a fine-grained finish to the cutting edge.

To prevent the ground-off steel dust from clogging the stone's abrasive surface use a lubricant such as slightly dilute washing-up liquid. Oil can be used for sharpening tools but is harder to clean off afterwards than the water-soluble soap, and is easily transferred invisibly to the pen and to absorbent writing surfaces.

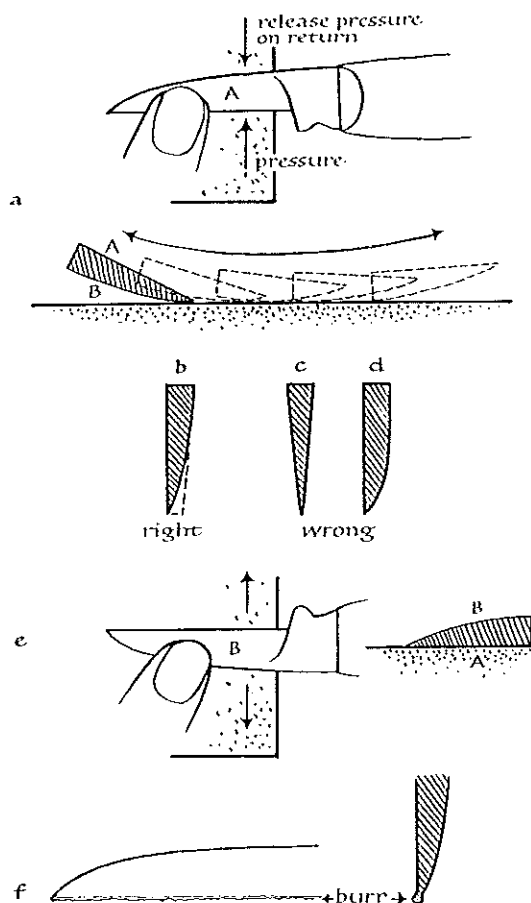
Examine the knife carefully with a magnifying glass before you begin and, especially if you are unfamiliar with sharpening tools, check again with the glass at each of the stages outlined below.

It may be necessary first to remove any factory-applied grinding which can still be seen on the cutting edge (Illus. 6a). The



Illus. 6: Removing the factory-made knife edge.

unwanted facets should be ground off, the knife held at 90° to the coarser stone (Illus. 6b, c). Once all traces of these facets have been removed, you are free to shape the right-hand side of the blade into a curve (Illus. 7), rocking the blade whilst grinding it against the stone and steadying it with the fingers of the left hand so that you can sense the amount of movement that is taking place. The rocking motion should be continuous from the blunt edge of the knife blade right down to its cutting edge (Illus. 7a). Apply pressure as you push the blade away from you, and release pressure on its return but do not remove the knife from the stone as the continuity of the stroke must be maintained. The result should then be a gradual curve from blunt



Illus. 7: Reshaping and sharpening the blade.

to cutting edge (Illus. 7b), not too tapering (Illus. 7c) or the edge could be easily broken when cutting tough quills, nor too obtuse (Illus. 7d) or it would need to be sharpened too frequently. The other side of the knife blade should be checked and ground absolutely flat on the stone (Illus. 7e); both processes can then be repeated on a finer grade of stone such as an Arkansas or fine India stone. A fine burr should develop along the cutting edge (Illus. 7f) which can be removed by stropping the blade against a thick piece of leather.

When this fine thread of steel has been stropped away, the edge should have achieved its ultimate sharpness with enough tooth to bite into the quill but not be so coarse as to leave a scratchy surface on the cut.

A knife made from reasonably good steel should not need to be drastically re-shaped or re-sharpened after you have made it. If it is used as it ought to be, exclusively for quills, a light sharpening on a hard Arkansas stone or the fine 4/0 emery will keep it in trim.

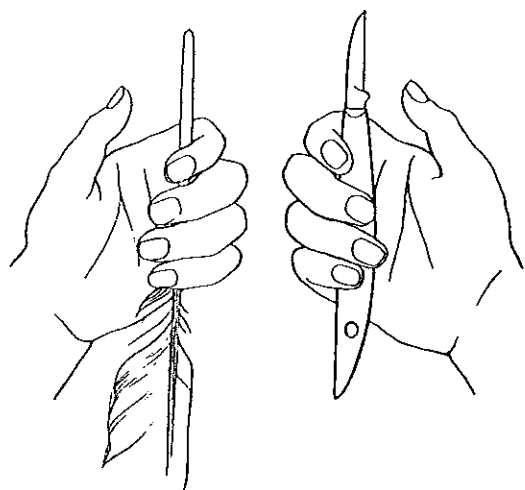
#### PRELIMINARY PRACTICE WITH THE PEN KNIFE

Before trying to produce a finished pen make yourself comfortable by establishing control over the knife and practise some of the hand movements and cutting techniques which are needed at each stage. Most of these will involve paring movements with the blade drawn towards the body. Every time you make a cut or a slit, carefully examine what you have done through a magnifying glass. By identifying each result with the feel of a particular action, you will begin to learn to see by 'looking with your fingertips'.

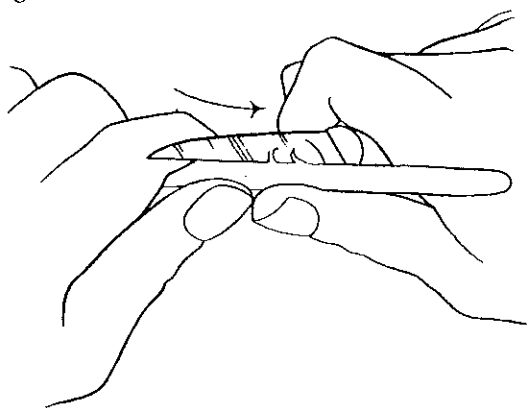
First, practise cutting and scooping by holding the quill and knife as in Illus. 8 between fingers and palms, steadying the wrists comfortably on the stomach. The thumbs will be free to control the rather pliable quill by supporting it against the pressure of the knife blade. Practise paring movements by taking thin shavings off the tough barrel of the quill (Illus. 9); concentrate entirely on establishing control over each slicing movement, sense the blade's edge as it bites into the quill as you would when cutting into a soft tomato. You will find that some parts of the knife are keener than others. Learn to feel for



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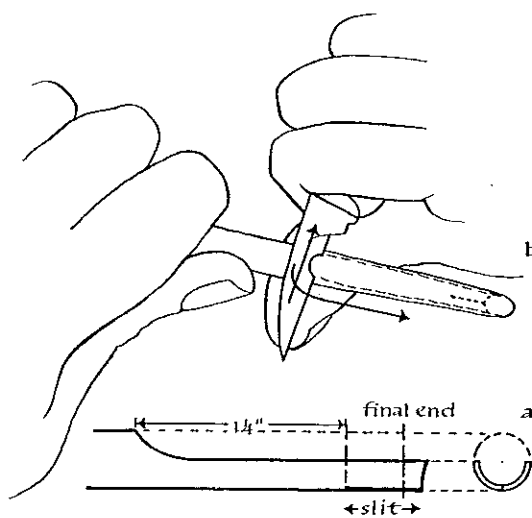


*Illus. 8:* Quill and knife should be gripped by the fingers to allow the thumbs to support and guide.



*Illus. 9:* Practise taking off fine slivers before starting to make a pen.

and recognize this. The general direction of the knife cut is along the length of the barrel, but at the same time, use the full length of the blade and draw the knife, in a sawing movement, at right-angles across the barrel (*Illus. 10b*). It is essential to acquire this slicing action especially when starting a cut in a tough quill. This enables the knife blade to cut into the material a little at a time – it is not an axe; remember the tomato!

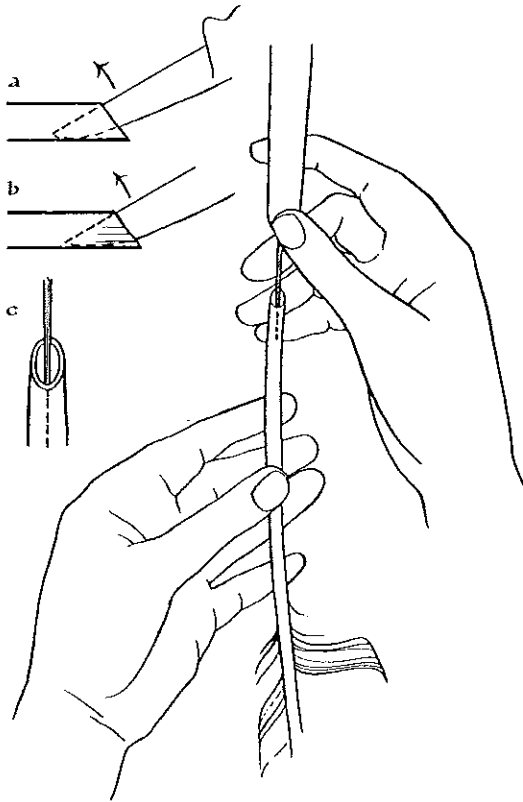


*Illus. 10:* Quill, supported by the thumbs, is sliced, using the full length of the knife blade.

You can now begin to practise making a complete longitudinal scoop on the underside of the barrel as in *Illus. 10a*. It is not necessary to make it all in one stroke. Before long, both left and right hand will unconsciously begin to work together to guide the knife and to help the blade bite into the pen. Do not forsake practising until you feel reasonably confident to take the next step. You may have found that the knife is not sufficiently sharp; if its edge is too coarse, the surface of the cut will look chalky or dry – the blade will need further stropping. If there is no bite to the blade, it may need to be returned to the stone. Whenever the knife cuts into the quill, the facet it leaves should have the sheen which a carver's sharp chisel leaves on hard wood.

Making a clean controlled slit in the quill which will allow the pen to flex enough to feed ink to the nib's edge, also requires practice. Most pens, with a nib up to 3 mm ( $\frac{1}{8}$  in.) wide will work well with a

slit  $1\frac{1}{2}$  times the width of the nib, though a tough turkey quill may need a longer slit to increase its flexibility. If the slit is made too long before trimming, a lot of the quill will be wasted because the side scoops have to be positioned in relation to where the slit eventually comes to a stop.

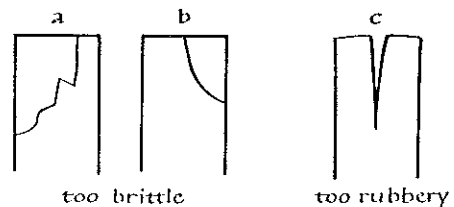


*Illus. 11:* A method of starting the slit by leverage.

Begin your practice in pen slitting by an exercise. Hold another quill and the knife as in *Illus. 11*. Note that your fingers will not need to be very close to the knife's edge at this stage. Insert the knife point, cutting edge uppermost, into the quill barrel (*Illus. 11a*). Gradually force the blade upwards, levering it from the

opposing inner wall until the quill cracks. The moment it does, release the upward pressure. If the quill is rightly cured, it should be like a crack in glass and run true – parallel with the barrel. Rotate the quill a fraction and repeat the process around its circumference (*Illus. 11b*). As you do, you will learn to gauge the amount of pressure needed to create the slit. The end will fray as you use up the available space, and its edge will become too pliable to present enough resistance to the knife to start a clean crack. As you feel this change in the tension of the quill, remember that you are still learning to experience and control your reflexes – 'to see with your fingers'.

A ragged, torn slit suggests that the quill is not sufficiently tempered, or that all the outer membrane has not been removed. A clean crack which does not run true but veers right or left, or in a zig-zag, indicates that the tempering was too heavy-handed and the characteristic grain of the quill has been destroyed. If the pen feels rubbery, as a plastic straw can, and refuses to crack, then it is not tempered enough (*Illus. 12*). Sometimes a pen will have a false slit, it *appears* to have a clean crack, but it has penetrated only partly beneath the surface; test for this by flexing the quill before proceeding. The slit can be lengthened further by twitching sharply upwards with a narrower quill or a pointed stick or paintbrush handle, using the same movement of the knife as in *Illus. 11*.



*Illus. 12:* Faults in the slit caused by imperfect tempering.

## Preparation of Quills and Reeds

When you feel confident with these techniques begin to work through the processes of making a complete pen.

To transform a tempered and prepared quill into a pen:

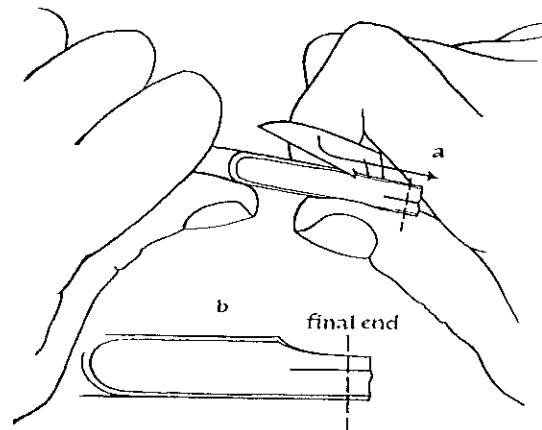
	Seconds	
1 Trim the barb to a comfortable length, leaving say 9 in of shaft.	.5	
2 Strip off the wide barb where it interferes with the writing hand.	5	
3 Form a slit.	3	
4 Slice out an under-scoop.	6	
5 Slice out two matching side-scoops,	22	
6 Flatten the underside of the point.	4	
7 Thin the nib point on the top side.	.5	
8 Trim the writing edge off square or oblique.	1	
9 Fine-trim the writing edge.	2	
10 Fit and adjust the reservoir.	13	
Approximate timing.	57	seconds
- when skilled.		total

- 1 Trim the barb (see above).
- 2 The barbs can interfere with the hold of the pen and any surplus should be stripped away (Illus. 1), using a knife cut when necessary to avoid tearing into the barrel.

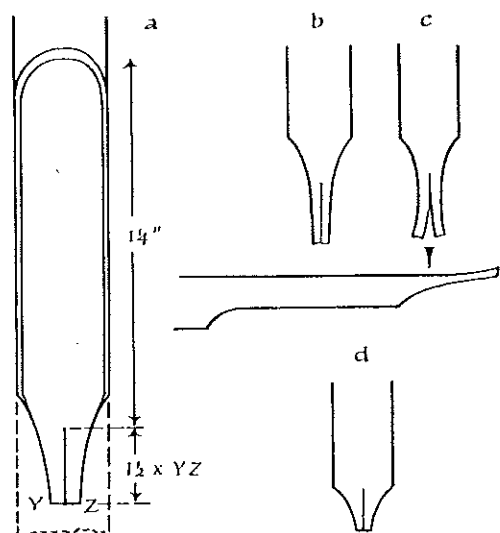
The feather ideally suited to the right-handed scribe comes from the left wing of the bird, because if it curves at all, it fits snugly around the knuckle of the index finger and only the wide barb needs to be stripped off. Unless they are very severely curved, as from some mature turkey wings, the first five flight feathers from either

wing may be used with reasonable comfort.

- 3 A narrow cleft running between the barbs marks the exact centre of the *underside* of the quill (Illus. 1a). Make a clean slit in the top of the barrel directly opposite this (Illus. 11c). If the slit is ragged, or does not run in a straight line, you can cut off the tip above the crack, and repeat the action until you are satisfied.
- 4 Next, turn the quill until it is bottom uppermost and make a longitudinal under-scoop starting about 30 mm (1¼ in.) from the termination of the slit. Pare it down until you have cut about halfway through the barrel (Illus. 10a) leaving the slit in the centre of this under-scoop (Illus. 10b).
- 5 When the pen is finally trimmed, the slit will need to be about 1½ times the nib width, so draw an imaginary line across the slit of the pen where the writing edge is to be (Illus. 13a), and gradually pare out a side-scoop alongside the slit to form half of the pen point (Illus. 13b). Copy the shape



*Illus. 13: Starting a side scoop allowing for wastage at the tip.*

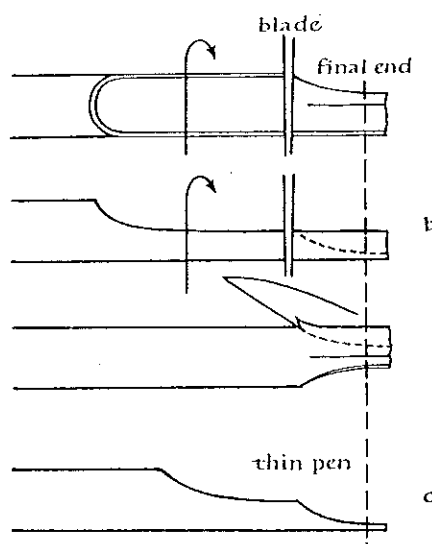
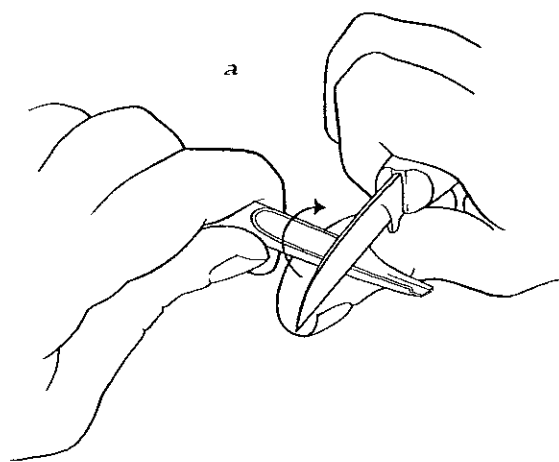


*Illus. 14: a* Copy the shape and proportions of the pen as you would a letterform.

*b - d* Unsuitable shapes.

(*Illus. 14a*) just as if you were copying a letterform. If, by scooping away *too* much, you produce a long, thin shape (*Illus. 14b*) the nib will be weak, and will allow the slit to open too far when pressed, so that the ink will not reach the tip (*Illus. 14c*). If the shape is too squat, and stubby as in *Illus. 14d*, the strong shoulders will prevent the slit from flexing enough to allow the ink to draw down from the reservoir along the slit, thus starving the tip after the first few marks.

Return the knife blade to where you started the first side-scoop (*Illus. 15a, b*), holding it at right-angles to the barrel. Rotate the quill until the knife blade comes into contact with the opposite side of the under-scoop. You will then be perfectly placed to begin the matching side-scoop on the other side of the pen slit. If one side does not match the other, then their strength and therefore their flexibility will be unequal.

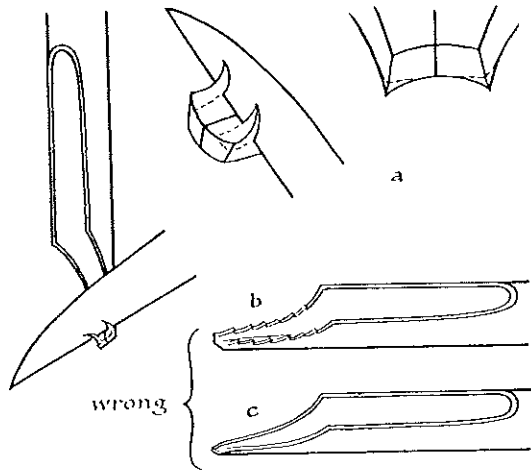


*Illus. 15: a and b* Positioning the blade to begin the second scoop. *c* Removing less of an underscoop gives stability to a thin-walled pen.

A sliver can be taken from either side at this stage to make adjustments, but remember that you are still going through a learning process, and are not expected to produce perfect pens yet; so as soon as you have done the best you can to match the scoops either side of the slit (*Illus. 14a*), go on to the next step.

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## Preparation of Quills and Reeds



*Illus. 16:* Flattening the underside of the nib to remove excess concavity.

- 6 On all but the narrowest pen points, the underside of the nib will be noticeably convex, reflecting the section of the tube from which it was cut. To avoid the risk of writing with hollow strokes, or of crushing the quill point when completing the final nibbing, you will need to flatten the underside of the point by scooping away as thin a sliver as possible without weakening the pen tip (*Illus. 16a*). This shaving must be made in one clean continuous stroke, any hesitation will allow the knife to judder, leaving ridges on the underside of the nib (*Illus. 16b*). Follow-through also prevents the knife from rounding off the tip of the nib (*Illus. 16c*).

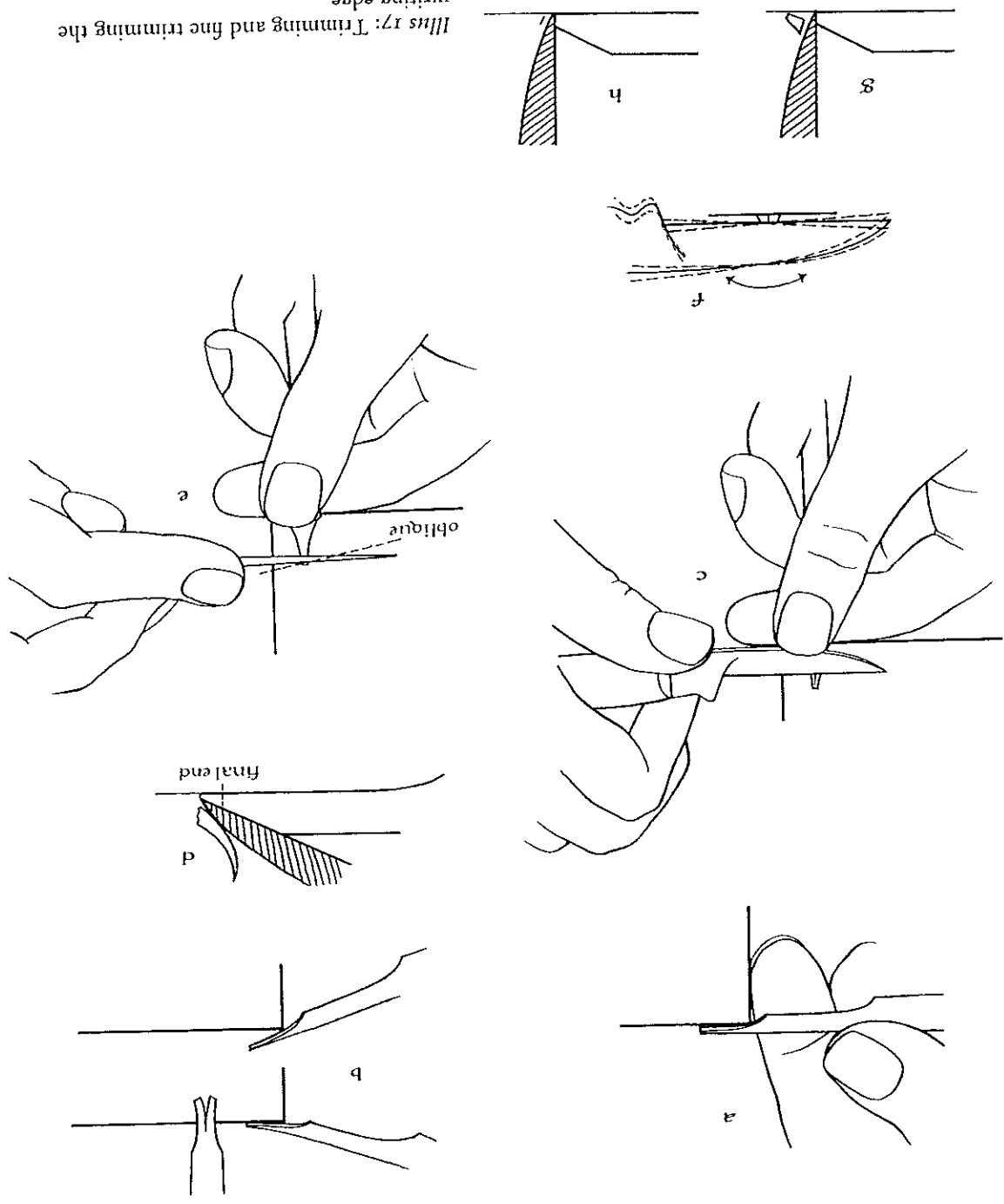
For the final steps, traditionally called nibbing, you will need a chopping block made from a tough piece of plastic, such as formica or perspex; if it is black, the nib can be seen more easily. Fix it to the corner of a table, or on a block which is raised enough to allow the finger to support the nib underneath (*Illus. 17a*) without tilting it at an angle (*Illus. 17b*). A flat ink-bottle top can be used as long as it

is taped firmly down to the table. A harder material, such as glass, will quickly blunt the knife, and most woods do not offer enough resistance to the blade.

- 7 Position the hands as in *Illus. 17c* and support the pen (*Illus. 17a*). To thin the top of the nib, the knife blade is placed flat side down and, on this occasion, pushed *away* from the body. Starting a little less than  $\frac{1}{8}$  in. (about 1 mm) back from the intended writing edge, ( $1\frac{1}{2}$  times its width away from the termination of the slit), remove the surplus tip by slicing downwards at an angle, steadily forcing the knife blade away from you with the left thumb (*Illus. 17c, d*). This thins the nib, helps the final trimming (*Illus. 17g, h*) and leaves less vertical surface to collect ink which can produce overloading at the tip when making thin strokes.
- 8 Still holding the quill flat on the slab, finish the nibbing by pressing the knife blade down at  $90^\circ$  and cut the nib off square or oblique (*Illus. 17e, g*). On a strong quill like turkey, even after the nib tip has been thinned, this stroke may require considerable force, and it may help to rock the knife blade gently while pressing downwards firmly (*Illus. 17f*), thus concentrating the thrust upon a small section of the nib at a time.
- 9 Repeat this downward cutting stroke, but this time taking off only the thinnest of slivers to remove any suspicion of roughness which may have been left by the first cut (*Illus. 17h*).

Finally, a careful examination with the magnifying glass will reveal any faulty cuts or imperfections, but before worrying too much about further details, make a reservoir for the ink, and write with the pen. If the slit is straight, the sides of the nib reasonably symmetrical and well shaped with the underside flattened, the

Illus 17: Trimming and fine trimming the writing edge.

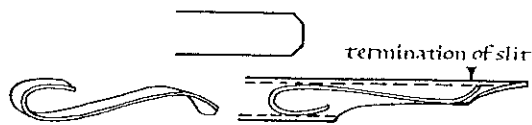


Donald Jackson

## Preparation of Quills and Reeds

pen should write, but the ink flow will need to be controlled, especially with a wide pen, which of course uses more ink at each stroke.

10 A reservoir is simply made by cutting a strip of metal (that will not rust) which is narrow enough to sit comfortably inside the quill (a strip from an aluminium drinks can is excellent) and bending it into a modified S-shape (Illus. 18). Insert it into the barrel and position it so that it holds itself in place by its own springiness. The tongue of the strip should just overlap the end of the slit which will then feed the ink to the writing edge. If it is positioned too near the tip it will cause the nib to flood; too far back and it will starve the nib.



Illus. 18: Shaping and positioning the reservoir.

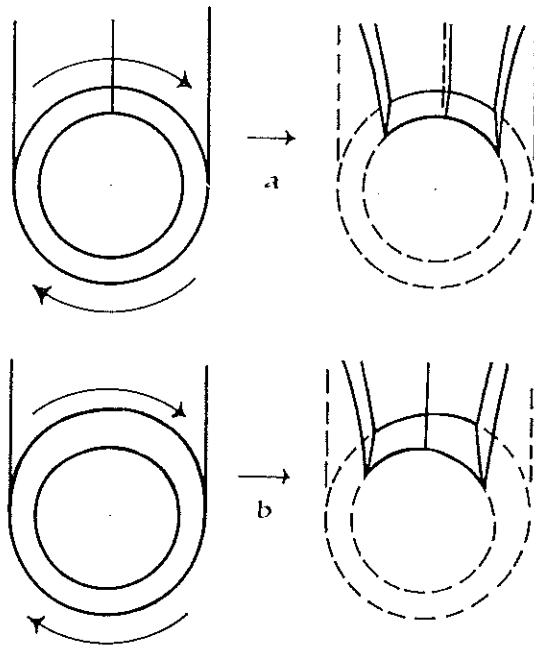
To begin with, the general finish and sharpness of the letters may not be as precise or as perfect as you have achieved with a metal pen, but the aim so far has been to help you reach the stage when you begin to *feel* the reason for using a quill so that the enhanced pleasure which comes from the act of writing with it will provide an incentive to improve your performance on a different level. It is almost certain that for the first time, some of the classical alphabets will begin to make 'sense' to you.

You will now be ready to practise some necessary refinements which have been purposely left out at each stage so far. Before attempting any subtleties it is a

good idea to consider briefly the kind of inks and writing surface you want to use with a quill pen – see page 34.

After practising the elementary steps of making a quill pen, use the following notes when working again through the stages 1 – 10.

- 1 As before.
- 2 As before.
- 3 It can be a mistake to rotate a strongly curved feather to fit the hand *after* making the slit which may thus be shifted off centre and because it 'leans' to one side, throws the two halves of the nib out of balance (Illus. 19a).

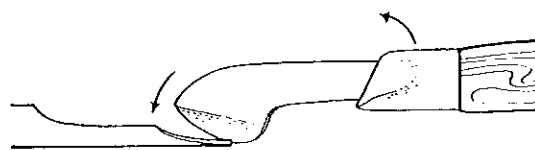


Illus. 19: a The slit should be at 90° to the writing surface. b Variation in barrel wall thickness needs to be compensated for.

Therefore it is important to choose a comfortable position first, then make the slit at the top dead centre of the quill as you look down on it. It is important to centre the slit for another

reason. The end grain of the quill appears to radiate (like a tree trunk) so if the knife is introduced off centre, although the slit may *start* vertical it will slew over to follow the natural grain producing the same result as Illus. 19a. If this happens, twist the barrel to align the 'end grain' of the slit at 90° to the writing surface before making the side-scoops. Another cause of imbalance, especially in strong turkey feathers, is the variation in thickness of the barrel wall which is usually thicker at its 'natural' top. If the feather is rotated for any reason the underside may need to be equalised as well as flattened at stage 6. (Illus. 19b)

The knife should be introduced only as much as is needed to *start* a clean crack. I do not recommend stabbing the knife point into the quill barrel while it is held flat on its back on the cutting slab, because it can leave an indentation on the ultimate writing edge, which will not close up tightly, nor is there much control over the length of the slit. An excellent alternative is the guillotine method of introducing a slit, which has been suggested by Norman Brown. A spade-shaped blade shaped like that of the old desk knives, which seem to be descended from the even older form of eraser knife, is rocked forward and down on the pen tip (which is supported by the 'chopping block' described earlier). This will 'concentrate the load at a point (of the blade) on a small section, just like scissors' and give an easily controlled start to the slit. If the blade is finely hollow or taper ground, it does not damage much of the underside of the quill, and 'there are Xacto blades that can be ground . . . to accomplish the same thing,' (Illus. 20). On a tough



*Illus. 20:* The scissor or guillotine action of a finely ground knife blade with an obtuse point can be easily controlled.

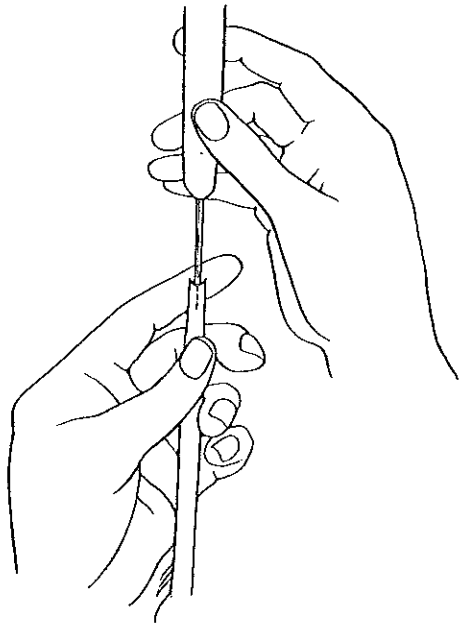
wide quill, two or more slits may be needed to give the right degree of flexibility and ink flow. The guillotine method would perhaps be best for this.

You should always be ready to adjust the slit if the ink does not seem to flow well. If the ink seems scraped or squeegee-ed onto the surface, then the slit is either too short or the ink is too thick. A compromise is usually the best solution, i.e. lengthen the slit a little, as described earlier and dilute the ink a little. When using colour (or coloured ink) which contains more pigment than normal black carbon ink, or working with gesso or gum ammoniac for gilding, the pen will need to be more pliable to allow the heavier 'ink' to flow – therefore the slit will need to be lengthened, and the nib, perhaps, made more slender than you would need for a sustained piece of writing in ordinary black ink. If the pen opens too much during writing, as a temporary solution the pen may be turned on its back and the two halves forced together by pressure.

I prefer to exchange stage 4 for stage 3 and make the under scoop before forming the slit because I find it easier to centre the slit on the under scoop than the other way round, but it requires a little more confidence than the beginner usually has when using a sharp knife. I cradle the quill between thumb and forefinger of the left hand and support the back of the blade in



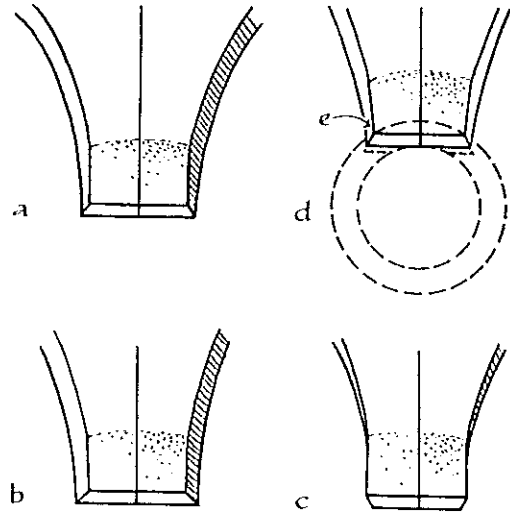
## Preparation of Quills and Reeds



*Illus. 21:* Supporting the knife blade when the slit is made *after* the under-scoop has been completed.

the crook of the forefinger, gradually applying pressure upwards on the underside of the barrel top towards the supporting thumb, and immediately reducing pressure when the barrel cracks (*Illus. 21*).

- 4 On a tough quill, more of the under scoop may need to be cut away to help flexibility. On a more delicate one, the scoop can be started nearer the pen tip, and slope more steeply down to around halfway through the barrel giving more stability to the nib shoulders (*Illus. 15c*).
- 5 In the 'learning pen' you concentrated on copying a shape and matching the side-scoops to produce equally balanced sides to the nib. But it is also necessary to angle the facets of the cuts so that they will help preserve the edge's sharpness for as long as possible. An exaggerated bevel (*Illus. 22b*) would



*Illus. 22:* A slight bevel on the side-scoops preserves the sharpness of the writing.

cause the edge to soften and curl too easily. An undercut facet (*Illus. 22c*) will soon lose its sharpness. As soon as the knife bites at the start of the scoop, it should be drawn to the tip and twisted at the same time, so that it ends at a *slight* bevel (*Illus. 22a*). It is exaggerated slightly in the diagram to make the point.

- 6 For small writing, it may not be necessary to flatten the underside of the point, as the ink will span the inside arch and can even give a pleasing concave detail to the serif, particularly on vellum. When a wider nib is needed, the flattening will be necessary as has been explained. When you flatten the underside of the nib, you can immediately gauge the maximum practicable width obtainable from a given quill (*Illus. 22d*). There should always be some thickness supporting the side facets of the nib (*Illus. 22,e*), or the pen softens and rounds off too quickly on the 'corners'.

- 7 Thinning the top side of the nib should not be confused with sharpening it. It should not be shaved to a sharp edge and used for writing without trimming (Illus. 17d). Again it will be too vulnerable to bluntness and softening. It is suggested that thinning the tip reduces the amount of ink gathering along the writing edge, thus helping to preserve thin strokes. I am unsure of this, but its thinness does make the final cuts much easier.
- 8 It took me a long time to realise fully the importance of the angle of the writing edge, thinking it sufficient to use a square-cut pen for all alphabets, and simply adjusting the angles by moving my hand. However, it is difficult to emphasize how important it is to experiment for yourself by adjusting the angle of the pen's edge, from square to sharp oblique in either direction, and gauging its effect on a given style. One of the chief advantages of the quill is its adaptability to different writing styles and personalities. A minute variation in obliqueness profoundly affects the letterform. You may discover, as I did, that some alphabets work naturally only when made with an oblique-cut pen.

It is at this stage that a strongly curved quill should be tailored to your choice of writing style or position; by adjusting the angle of the nib cut to accommodate the angle of the quill shaft and barrel in relation to the writing surface.

The shaping of the tip should be practised and its effect on your writing puzzled through. Only by cutting, writing and re-cutting, carefully analysing the result, will you acquire the confidence to change to a more comfortable angle or re-sharpen the pen, even after you have

started what is to be a finished piece. The sensitive eye is more forgiving of a change for the better within a piece of work than it is of consistent but unhappily-formed writing. The guillotine method, using the eraser-shaped blade in a rolling action to re-trim or re-align the nib's edge while supporting the pen as in Illus. 20, should give a precise and controlled result for these angle modifications.

The facets of the two side-scoops, the underside of the nib, and the final writing edge, should have a sheen which shows that there is no coarseness on the blade's edge; the sharper the cut, the sharper will be the letter.

Depending on its quality, the quill should stay sharp longest when used on well-made and prepared vellum, but even this material will blunt the edges after a time, especially when pounce or sandarac has been used on its surface.

To re-sharpen a pen in mid-line of writing is unnerving, but practice will give confidence, and it is preferable to re-trim than to change to another sharpened quill which may have an altogether different feel in the hand, and which because of its curve, may address the surface at a slightly different angle.

- 9 To re-trim, the ink should be wiped from the nib and a first re-sharpening can be effected simply by taking a thin sliver off the underside of the nib (Illus. 16a), just enough to remove the bluntness of the tip. This method should suffice for at least one more re-sharpening. A heavy turkey pen can be re-trimmed several times in this way. The point will eventually become too thin and pliable, however, and the side-scoops should then be re-cut, and the writing edge re-trimmed. The importance of your earlier practice in taking off thin shavings is tested when

## Preparation of Quills and Reeds

re-trimming, because so little ought to be taken off each side and from the tip (the underside has already been done at the first stage of re-trimming) that the slit need not be lengthened until after two or three re-trims.

So little needs to be removed (and a good quill should be jealously treasured) that I have written over 72 documents with the remaining usable half (about 40 mm or  $1\frac{1}{2}$  in.) of one goose-quill pen which was trimmed at least once after each piece of writing of 14 lines on vellum. After all this description, perhaps it is a good time to recall that after practice you should be able to shape and trim a pen in under one minute.

10 The reservoir not only stores ink, it controls the rush of ink to the tip. This function in conjunction with the angle at which the pen is presented to the writing surface, and the angle of the surface itself, will have a profound effect on the sharpness of the writing.

To understand this better, try writing without a reservoir in a fully-charged quill held vertical to a flat surface, then tilt the board by degrees, writing at each step and take note of the changes. You will find that generally, a fully-charged quill needed for sharp, spontaneous writing will have to be held at a shallower angle than a steel nib or fountain pen, and the board tilted to accept the ink with more grace.

For thinner inks, dipping is quite satisfactory providing the ink is gathered on the underside of the pen and collected in the reservoir. Ink coating the top as well as the bottom of the nib tends to produce clumsy strokes. The surplus can be lightly brushed off against a strategically positioned pen wiper, made perhaps from

an old suede glove, without slowing the pace of writing appreciably.

For gouache (opaque water colour) 'inks' which need to be kept well stirred, like soup, a hog-hair or similar stiff brush should be used to prime the pen on the underside so that any coagulating ink can be cleaned off at the same time as reloading it.

Most of the operations which have been outlined so far, are aimed to help you make quills for fine, sharp writing – to achieve maximum contrast between thick and thin strokes. Some styles, however, do not call for this, as many of the loveliest Renaissance hands attest. The drawn, quill-pen line has been used by artists right through to the present time, with a range and vigour that suggest wider opportunities for its use as such by calligraphers today.

For varying degrees of soft monoline strokes, the pen should be tempered and made with just the same precision. Experiments can be made in adjusting the point by writing and shaping it on a very fine grade of emery paper (say 600). The nib can also be shaped with the quill knife, the underside of the tip cut away to present a thicker section of the barrel to the writing surface, whatever direction the pen is moved. A uniform thin line can be obtained by using the corner of a square-cut pen held tilted on its side. The composition of the quill and capillary attraction combine to make this method work as well now as when it was used in the decoration of the Book of Kells over 1200 years ago.

### INKS

It is difficult for a beginner to grasp fully the effect which speed and ink flow have on the personality of even simple

letterforms, but speed and rhythm are essential ingredients of fine writing. The responsiveness of a quill will free you to write faster; however, the instrument has to be tuned and charged with the right type and amount of 'fuel' to be capable of spontaneous and sustained 'acceleration' (as when making a flourish). A well-formed letter made slowly, with a sparse ink-flow, is quite different from a well-formed letter written quickly with a fully-charged pen. The latter shape can be made and finished before the ink has time to spread and flood from the nib. The slowly-formed mark requires that the ink is held more in check; if the ink is held in check, the potential for 'acceleration' is suppressed too.

After using a quill, it will not be long before you start to question the handling qualities, appearance, and permanence of ready-made bottled inks. Non-waterproof inks are manufactured for use in fountain pens and waterproof inks are meant for drawing and painting.

A fountain pen ink must be 'thin' enough to flow readily through a series of baffles (the controlled leak principle), and onto the paper via a comparatively rigid nib; it must not clog the storage or feed system even when left unused for periods of time. The usual answer to both these requirements runs directly counter to the needs of a quill used for fine writing, for both technical and aesthetic reasons.

Fountain pen inks contain chemical dyes and solvents but have little gum or pigment because these might cause clogging; they have a low surface tension and so tend to spread and sink into the writing surface causing thickened strokes and feathering when they are used in a quill or steel nib which is designed to dispense ink more generously. They also tend to dry unevenly and transparently,

especially on wide letters. Waterproof ink contains shellac and is generally too glutinous for fine writing.

Because of its flexibility and direct ink supply, the quill is able to accommodate inks which do have more density and surface tension, thus affording us the choice of using opaque even colour which does not spread or sink. A quill therefore is made to handle a slow ink quickly; whereas a fountain pen is designed to dispense a quick ink slowly.

#### WRITING SURFACE

The third element in the partnership of ink and pen is of course the writing surface. When ink is deposited quickly and generously, the receptivity of the surface becomes more critical. Vellum, the preparation of which is described in another article, provides the right kind of traction as the third part of the trio. The confidence that follows getting these three elements in harmony gives another boost to the spirit as well as the form of your writing.

#### THE CARE OF QUILL PENS

A quill which is left to dry quickly after use, may shrink slightly and then distort, (as paper does after colour is applied) and a good pen can be spoiled. However, quills need not be kept soaking at all times, especially when they are needed for fine sharp writing at small sizes, when the pen needs to be kept dry and hard. However, there is a case for taking steps to compensate for over-drying especially now that many of our rooms, winter and summer, are so low in humidity. Placing the feather shaft downwards on a wet

## Preparation of Quills and Reeds

sponge in a tall covered jar would seem to be a good compromise. A well-tempered pen should then remain in stable shape.

### REED PENS

The first point to make about the reed pen is that it is not made from bamboo. Although the terms are often used indiscriminately, viewed from our perspective – that of making expressive as well as coherent letters, the characteristics of reed and bamboo are quite different.

The split-reed pen has been in continuous and general use since the days of the Pharaohs. It is still the principal writing instrument of the Arab calligrapher, and like our broad pen, it relies for its visual interest on its ability to switch from a fine line to a fat one, by change of direction rather than pressure. It can combine the delightful attributes of lightness with the pliability and strength which characterizes a well-made quill. The bamboo, in comparison, feels stiff, dull and heavy, even after it has been pared thin and slit several times. These differences, albeit subtle, reinforce the importance of developing a sense of touch and a sensitive response to the tools we use for making letters; only by doing this can our writing become sensitive and responsive too.

Tall reeds (*Phragmites communis*) grow wild in many parts of the world but, like the quill, some species are more suited for writing than others. In the East they are specially selected according to season and prepared to produce a pen which is tough enough to keep its edge well but is also flexible and light. However, an Arab calligrapher friend has found that the pale reeds of the South of France are quite as agreeable to write with as the reeds from

his native Sudan, where the upper part of a mature reed, much darker in colour, is used for pen making. So you may well be able to obtain a suitable local supply.

The principles of cutting and trimming are similar to those of quill-making, except that a single, shallow under-scoop terminating at the writing edge and made just as for a quill, should be sufficient to make a good pen without making additional side-scoops. Because the barrel wall is proportionately thicker than that of a quill, a single long slit ought to provide enough flexibility without causing the pen halves to open too much. After flattening the underside, adjust the width and trim off the sharp side edges created by the under-scoop. The nib can then be trimmed in the same way as a quill.

The aim of flattening the underside of a reed is to pare away the soft, pithy, inner lining (what the Arab calligraphers call the 'flesh') to arrive at the tough outer edge of the reed (the 'bone'). The fibres are more densely concentrated there and will keep a sharp writing edge longer.

Islamic calligraphers do not generally use reservoirs, preferring to control the ink at source by taking it from an ink-soaked pad of silk placed in a small jar, but for extended flourishes we may need to fit a reservoir as described in making a quill. To prevent the absorbent reed from robbing ink from the letters, the pen should be allowed to stand in the ink long enough to reach saturation point before beginning to write.

The reed is much simpler to cut and shape than the quill pen, so apart from its intrinsic qualities as a writing instrument, it can provide an ideal tool for experimenting with most pen-cutting techniques – assessing the effects of different angles of oblique cuts, both left- and right-handed, and it is an ideal

*Donald Jackson*

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introduction to a deeper understanding of Alfred Fairbank's definition of writing as 'a system of movements involving touch'.

It is not easy to acquire practical techniques from books, and there are many excellent alternative methods to those described here, but it is hoped that by

following the directions for knife sharpening and for tempering and shaping quills outlined above and practising the various techniques described, you will gain the confidence to take alternative steps of your own. Skill is transferable, and the ability to vary, invent and translate other methods to your needs will grow. This should be only a beginning.

# Ink

M. THERESE FISHER

This article is reprinted (in a slightly abridged form) from the earlier *Calligrapher's Handbook*.

Ink is the term for any fluid with which records are made on parchment, paper or similar substances. The importance of the part played by the ink used in writing a manuscript is often disregarded. On the right choice of ink depend the legibility, permanence and beauty of the writing. The student should take care to ensure that any ink employed has the following qualities.

It must flow freely, be permanent, and be even in colour. It should have a grittiness rather than a stickiness. It should be non-corrosive, non-poisonous, not easily erased and non-fermentable. This last requirement can be fulfilled by the addition of some antiseptic such as phenol or thymol (see Recipes 2 and 4). All ink should flow freely from the pen used, but in hot weather, overheated rooms and hot climates it is not the fault of the ink if this is difficult to control. Ink which flows easily in an even climate becomes temporarily thick and intractable in surroundings which are too warm and dry.

There are only two methods of preparing ink given in classical and mediaeval recipes.

1. Mixing gum with lamp-black: this is permanent and unchanging.
2. Treating salts of iron with tannic acid: such ink fades to that brown tint familiar in western manuscripts. Iron gall inks require a small proportion of

strong acid to render them stable and for that reason may bite through the paper or parchment in time. Judging by appearance some ink has been a mixture of both kinds and so faded unevenly.

Carbon inks can be classified thus:

Carbon blacks consisting of practically pure carbon in amorphous condition

Gas black – derived from incomplete combustion of gases and substantially free from grease.  
Lamp black – derived from the incomplete combustion of oils. Used for centuries before gas black was obtainable.

*To prepare Chinese ink (lamp-black):* the Chinese never kept liquid ink in bottles or inkwells but prepared as much as they needed at a time. For this purpose they had a slab of marble or other stone which had a small round cavity at one end. A few drops of water were poured over the finely polished surface and the stick or cake of ink was gently rubbed against it, the ink flowing into the cavity.

Distilled water should always be used or, if it cannot be obtained, rainwater that has been boiled and run through a single filter paper, or ordinary potable water which has been brought to the boil and allowed to cool.

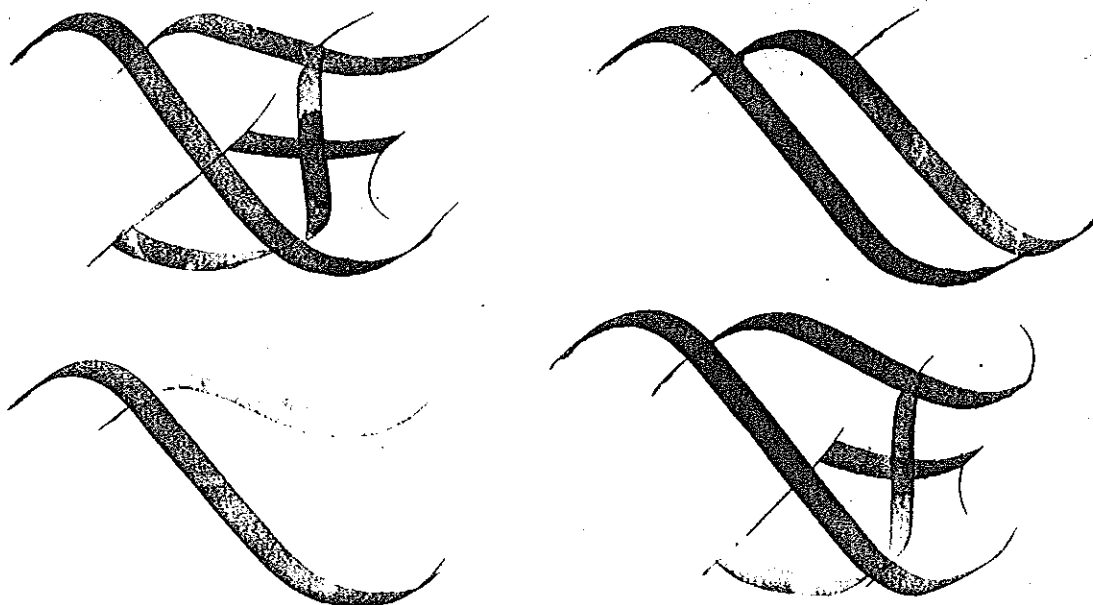
Liquid preparations of Indian ink are sometimes made by grinding up with water fragments of Chinese and Japanese sticks which have been broken in transit.

Lamp black has been superseded to a certain extent by carbon black which is now manufactured on an extensive scale from the natural gases issuing from the oil-wells of the USA.

Inks which will not be affected by water when dry are called waterproof inks. They are too heavy and sticky for ordinary use and do not flow freely but are convenient for outlines if the outlined forms are to be coloured afterwards.

Ink can be removed from skins or paper by very careful scratching with a sharp knife, or better still by long and careful use of a soft rubber. The surface can then be

smoothed and polished with a flat ivory paper knife after which it should be possible to write again without the ink floating; but it is advisable to use very little ink or colour in the pen for such corrections. Ink that is diluted with vinegar cannot be easily erased. There are one or two good British and American typists' erasers on the market now, including one in pencil form, which are effective when handled with great care and if a soft rubber is used gently after, always with the grain and never against it. Palimpsests are vellum manuscripts from which the writing has been erased by rubbing the surface with pumice stone so that it can be used again. Many writings of classical times were undoubtedly lost this way, and as many preserved.



Edward Johnston: Initial letters,  $2\frac{1}{2}$  in. high, one of several trials for the opening of a calligraphic letter to Alfred Fairbank, 19 September 1941. Written in watered blue ink.  
By courtesy of the Crafts Study Centre, Bath.



Ink	Comment
<p>1 2697 BC. Chinese stick ink consists of lamp black baked up with some glutinous substance; the finer oriental kinds are delicately perfumed, often with musk.</p> <p>Graily Hewitt gives the best and simplest method of preparing it: 'Into a clean palette slant put a salt-spoon of water and then, by watch, rub the stick for 3 or 4 minutes. If it then gives a good black, that is your gauge. If not black enough rub another minute. So then you know your need of water and amount of rubbing to repeat exactly the same density. Of course the water should be rain or distilled.'</p> <p>Another authority advises that it should always be rubbed down in a palette with a tooth matt, i.e. roughened surface.</p>	<p>Improves with keeping. Should never be used until at least 3 years old, should be frequently rubbed with the hand to preserve the polish which is its protective coating.</p> <p>New stick inks now being imported are of doubtful quality and fade after much exposure to light.</p> <p>Only good Chinese stick ink rubbed down according to the requirements of the scribe using it is absolutely reliable and endures the test of time without change.</p>
<p>2 AD 1540. Palatino's Recipe.</p> <p>Soak 3 oz. galls coarsely crushed in <math>1\frac{5}{8}</math> pints rainwater.</p> <p>Leave in the sun 1 or 2 days.</p> <p>Add 2 oz. copperas, finely crushed, stir well with a fig stick.</p> <p>Leave in the sun 1 or 2 days.</p> <p>Add 1 oz. gum arabic and leave one day in the sun.</p>	<p>Made and used by the late Colonel Crosland who writes:</p> <p>'I found <math>\frac{1}{2}</math> oz. gum sufficient.</p> <p>The mixture should be carefully strained, bottled with India-rubber corks - re-bottled after sediment has settled.</p> <p>Phenol should be used to prevent mould.</p> <p>When I had it prepared by a careful chemist the mixture was finally warmed (not boiled) for 15 minutes. This infusion (without boiling) is advised in <i>L'Arte di Scrivere dell'Encyclopedia Methodica</i>, Padua, 1796.</p> <p>It is unlikely to fade for a long time.'</p>
<p>3 1672. Edward Cocker's prescription from <i>The Pen's Transcendency</i>.</p> <p>Pour 2 gallons of rainwater into an earthen stand or vessel that is well leaded or glazed within; and infuse in it 2 pounds of gum Arabic, 2 pounds of Blew-galls [Blue] bruised, 1 pound of Copperas and 2 oz. of Roch [Rock] Allum: stir it every morning with a stick for 10 days and then you may use it.</p> <p>You may vary the quantity observing the same proportions.</p>	<p>Greyish when first used, turns black after a few days. Fluid and easy to use but inclined to eat into the skin or paper.</p> <p>Fades a little after long exposure to light.</p>

M. Thérèse Fisher

Ink	Comment
<p>4 1904. Dr Ainsworth Mitchell's ink. (i) Dissolve 1½ oz. of tannin in 1 pint of warm water. (ii) Dissolve 1½ oz. of copperas in ½ pint of water. Mix (i) and (ii) and add 1% (say ½ oz.) of gum arabic also ½ drachm phenol (Calvert's carbolic acid). Expose to air and sun for darkening and stir frequently. Keep in an earthen vessel covered with muslin and stir every day for a week. After darkening add 1 in 1,000 parts of hydrochloric acid. Let the ink settle for a week and decant. Warming accelerates the darkening but the ink should not be boiled.</p>	<p>Made, used and praised by the late Colonel Crosland, who writes: 'This ink is superior to Palatino's in appearance and permanence.'</p>
<p>5 1927. Edward Johnston's Recipes from the S.S.I. Record Book.</p>	
<p><i>Black ink</i> Yellow ochre + ivory black water (a little vermilion) + gum water. Ivory black has a remarkable quality of absorbing colours (Church) and so makes mixtures darker than you would expect. The yellow ochre powder is a gritty 'earth' which helps.</p>	<p>Easy and convenient to make and has not been known to fade at all even after long exposure to light.  As Edward Johnston said to the Society: 'A gritty ink is better than a slimy one.'</p>
<p><i>Red ink</i> Scarlet vermilion + water + gum water.</p>	<p>Is unlikely to fade, vermilion mostly improves with age. Edward Johnston writes: 'I find a very little (solid) Oxgall a help, it has the objection of being dark but it lasts much longer than the liquid and I am used to it. Very little must be used or it will make the colours spread and soak.'</p>

## Ink

The origin of ink is still a matter of dispute, as ancient records differ. There were only a few kinds, but in composition and appearance they preserve a remarkable identity, though belonging to countries and epochs widely separated. The basis of ink both in China and ancient Egypt was carbon derived from lamp black. A manuscript written by Chien-ki-Souen dating back to 2697 BC in which the entire process of making ink is described and illustrated was discovered in China some years ago and translated into French by Jametel in 1882.

In ancient Egypt there is a roll dating from about 2500 BC which is probably the oldest extant writing on papyrus. One of the earliest Greek parchments dating back to 2200 BC relates to the sale of a vineyard. The carbon ink of ancient Egypt was prepared in solid sticks as in China, and was used down to the fifth century: remains found in inkstands would seem to confirm that it was available in fluid form also. Among the coloured inks the Egyptians used were red ochre, yellow ochre, malachite, and to make a blue colour they ground down fragments of sapphire, haematite, emerald and topaz. They were made into cakes, presumably with gum, to permit emulsification of the pigment in water and to act as a fixative. The Hebrews reserved carbon inks for religious writings. Dioscorides, 40 BC, physician to Anthony and Cleopatra, in a dissertation on the medicinal use of herbs gives the proportion of lamp black and oil to be used as three to one. Vitruvius, 30 BC-AD 14, describes a method of preparing soot from pitch-pine mixed with gum and dried in the sun.

It is to the female wasp that we are indebted for gall ink. This was probably invented in the anterior orient, for the species of oak on which the gall wasp

deposits its ova that form the excrescences known as galls grows in Asia Minor, Syria and Persia. It seems to have come into existence only during the first centuries of our era, and was used by the Persians, and mentioned by Philo of Byzantium in the second century. Byzantine ink was a different tint and may have been a bituminous preparation, probably semi-liquid bitumen used directly and without further preparation. Possibly the earliest extant document written with iron ink is an Egyptian parchment of about the seventh century AD. From then the use of iron inks spread to Europe but the transition from carbon ink, often erroneously called Indian ink, to that of galls and iron was very gradual. Astle, Keeper of the Records in the Tower of London 1803, found that black ink used by the Anglo-Saxons in documents of the seventh, eighth and ninth centuries had preserved its intensity better than that used at later dates. He came to the conclusion that it was because the earlier inks contained carbon. The earliest reference to it is made by the monk Theophilus who wrote *Diversum Artium Schedula* in the eleventh century. He describes an ink prepared from thorn wood: an aqueous extract of the wood was evaporated to dryness and the powder was mixed with green vitriol.

The word ink was derived from the Latin *encaustum*, the name given to pigment first used in baking tiles. Later it was restricted to the purple ink with which Roman emperors signed their names, the black ink being called *atramentum*, *ater*—black. Ink made from the pigment of the cuttle-fish, i.e. sepia, was used by the Romans, and from the Murex mollusc was obtained the famous Tyrian purple. They used also gold and silver inks which consisted of finely divided metals

incorporated with gum and covered with beeswax. Plutarch, AD 46–120, mentions red ink (to which we owe the word rubric) which was compounded of minium or vermilion. Sidonius says that red ochre was used. Wecker of Basle in 1612 describes an indelible ink compounded of lamp black and linseed oil. Various methods of preparing coloured inks were mentioned by Canneparius of Venice in 1660; Persian berries for yellow, logwood mixed with copper acetate and alum for purple. Various substances were used by the Chinese as the original source of lamp black, e.g. rice-straw, pinewood, haricot beans, tung-oil and sesame oil. Today European lamp black is made from impurities obtained as by-products in the manufacture of turpentine, oil, tar, etc.

Permanency in colours generally has reference to their ability to withstand sunlight and ordinary atmospheric conditions; carbon black excels all others in this respect. There are two inks most pleasing to modern scribes: Chinese stick ink which must be rubbed down, and Higgins' Drawing Ink from which the scribe's quill or pen is filled from a quill in the cork of the bottle. Of recipes there are a great many, a few of these are included here. It must be remembered that the test of ink is in its contact with the skin or paper and not by itself. Innumerable inks are on the market, but only by trial and error, and by constant experiment, can the one be found which expresses the craftsmanship of the individual.

*Editor's note—recommended reading:*

'Inks and Pigments: tools of the scribe' by Norman Brown and Alice Sink, article in three parts in *ALPHABET The Friends of Calligraphy* journal (editor: John Prestianni) – Summer 1983, Volume 8 no. 3; Fall 1983, Volume 9 no. 1; Spring 1984, Volume 9 no. 2.