particularly for inlay. Although more easily and economically obtained than ivory, these materials have a coarser grain and are more brittle and subject to discoloration.

For most of human history, ivory has been a luxury, and the frequency with which it seems to occur in tools made for Ottoman calligraphers is partly an accident of survival—objects made of precious materials are more likely to be preserved than those made of common substances. But the abundance of ivory also reflects the expanse and power of the Ottoman Empire, which by the early modern period had gained control of essential East African trade routes.

Another prestigious material from which entire mak̤as have been carved is nacre (fig. 7). Also known as mother-of-pearl, nacre is a secretion composed primarily of calcium carbonate that certain species of mollusk—mostly abalone and pearl oyster—deposit onto the inner surface of their shell. Its lustrous appearance ranges from rainbowlike iridescence to an almost glassy character. These three mak̤as are extravagantly carved. One is a beautiful piece of work with a grapevine border carved in three levels of relief.

On another side of the mak̤a, found lying at the back of the room, was a disk of what appeared to be malta, or shell. It was the size of a coin, and the cut edges showed the crosshatch mark of a chisel. The surface was smooth, and it was difficult to tell whether it was a coin or a small puck. On the other side was a small piece of wood, the center of which had been carved into a very thin disk. The wood was light brown, and the surface was smooth and shiny. The piece was the size of a coin and was carved with a crosshatch mark.

Because the wood was light brown, it was difficult to tell whether it was a coin or a small puck. On the other side was a small piece of wood, the center of which had been carved into a very thin disk. The wood was light brown, and the surface was smooth and shiny. The piece was the size of a coin and was carved with a crosshatch mark.

On the other side of the room, there was another piece of wood, this time a small puck. The puck was the size of a coin and was carved with a crosshatch mark. The wood was light brown, and the surface was smooth and shiny.

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On another, a fanciful sea serpent snakes downward, its neck and tail sprouting scales and its tongue erupting between sharp teeth (FIG. 8). The third makta is a more serene work, terminating at top in a dervish turban (FIG. 9). For its owner, a mother-of-pearl makta, on one hand, may have evoked Qur’anic references to God’s beneficence, or the Prophetic tradition that describes tents in paradise as enormous hollowed-out pearls. On the other hand, its luminous surface may simply have called to mind tropical seas.

KNIVES
Because of the all-consuming importance of the cut of the pen, calligraphers devoted considerable attention and resources to the penknife itself. The hardness of the reed required a high-quality blade to make a clean cut. Dating from the 1700s through the 1800s, the knives illustrated in FIGS. 10, 11, and 12 represent the high-water mark for the production of calligraphers’ knives in the Islamic lands, with regard to specialization, manufacture, and materials. The business end of the knife—the blade—had evolved into a variety of profiles as elegant as they were functional. Yazar remarks that while most calligraphers make do with one penknife, it is really better to have at least four differently shaped blades.

FIGURE 10
Penknives, Turkey, 1700s and 1800s, steel blades, brass mounts, handle materials include ivory and agate; lengths range from 9.5 to 7.2 inches (24.1 to 18.4 cm).
According to Yazir, the “cut” (T. küt), with a rounded or blunt nose, was used for shaving down the mouth of the pen to create the nib. The “cypress” (T. selvi), with a blade terminating in an almost symmetrical point, was used to cut the writing edge. Not represented here is the “shard of glass” (T. cam kırağ), a blunt-nosed blade with a spur on the spine that was used to cut off both ends of the reed before the process of shaping the mouth. The “willow leaf” (T. söğüt yaprağı) was used for corrections. Like the cypress, its blade was pointed at the tip, but the willow leaf was smaller and not symmetrical: only the cutting edge curved to make the point. With this rather inflexible blade, the calligrapher could scrape away tiny mistakes or stray bits of ink, for example to clean up the profile of a letter. Yazir warns that the sharp tip can accidentally puncture the paper. To remove larger flaws in the writing, he recommends using a blunt-ended knife that would provide broader contact with the surface of the paper.
Blades of tempered and watered steel were highly prized for their ability to take and hold a fine edge. In the usual practice, the master cutler would forge the blade, an assistant would then file it into shape, and the master would complete the hardening. Master cutlers sometimes signed their work with tiny plugs in which their names were written in relief. The plugs, often encircled in gold or brass, were inserted into the blade near the collar that joins blade to handle. Written in minuscule script, the names 'Ali, Riza, and Safi can be deciphered on the knife blades illustrated in this publication.

The handles of the penknives further demonstrate the elevated status of the instrument. Joined to the blade by a collar of brass, silver, or gold, the handles again reveal the artists' delight in costly and exotic materials, as well as an intrinsic appreciation for their properties. For a particularly extravagant knife, a branch of coral is used in its natural form for the handle (FIG. 12). More often, coral is used in a highly polished form as a
contrastings band of color set against ebony or ivory. Ivory handles take full advantage of the material’s versatility: Carved literally to the hilt, they may be fluted, faceted, ringed, or spiraled. The ivory handle of one knife has been whimsically carved to resemble bamboo cone. Bone and horn are also put into service for knife handles. In order to straighten it for use as a handle, horn first had to be heated. Only after scraping its surface clean, then carving and buffing it to a beautiful shine, could its translucency be appreciated. The end of the handle away from the blade might be carved into a decorative finial, or it might be fitted with a polished agate to serve as a burnishing tool. A stylized Mevlevi dervish turban carved from ivory is the culmination for a singularly elegant knife (FIG. 13). The restrained color scheme of this knife—ivory, silver, and black—betrays the elaborateness of its decorative program. The handle features a minutely textured basket weave in silver, capped at either end by a sequence of bands patterned with crescents, herring bones, and reciprocal looping.

The superb penknives made for calligraphers’ writing sets represented the end of a grand tradition of blade manufacture in the Islamic lands. By the last decades of the 1800s, the specialized craft of making penknives had fallen victim to the cheaper and often superior imported knives from Europe. Mirza Husayn Khan Tahvidar, in his Jaughrat-i Isfahan (“Geography of Isfahan”) of 1870, noted:

Before European knives came into common use (the cutlers) used to make steel knives in Isfahan; their shape was like the gidik, something between a knife (kard) and a poniard (qumeh), with long bone handles and a short steel blade, which could be bent. . . Ahmad Isfahani was a famous cutler in Safavid times; his penknives lasted for more than 200 years. There was one Mahmud in the beginning of the reign of the late khaqan. His penknives were twins of the work of Ahmad. . . These penknives of Ahmad and Mahmud can be found in some old calligrapher families. In the end of the reign of the late shahinshah, one or two men searched for these knives and bought the work of Ahmad and Mahmud for a high price. They collected the knives of the (above mentioned) families. It is not known what became of these knives or where they were taken. At present there is no trace of them; if they were (sic) they could possibly used for another 200 years. Cutlers make the same type of penknives now, but they are not used for sharpening pens, and their steel is not as well hardened as before. . . The ones that are made now are women’s utensils who (sic) use them to cut the hair of their eyebrows. 35

INKS AND INKWELLS
Preparation of ink from scratch was a difficult and time-consuming process. In the early centuries, brown inks were produced using complicated and sometimes caustic ingredients, such as orange-tree sap, pomegranate peels, oak galls, and vitriols. Black inks, composed primarily of carbon (lamp black or soot), water, and gum Arabic, came
in the early
centuries. Black
wood was carved
and decorated
to create works of
art and utility. As
customs evolved,
the shape and
design of the
tools changed
to reflect the
changing tastes
and needs of the
time. The
 continue...

into fashion and proved more resistant to fading and less damaging to the support. Mistakes were easier to correct in soot inks; they did not penetrate the paper, and because they were water soluble it was easier to “lick off” mistakes. Highly regarded inks from India were exported as dried cakes, which had to be wetted with water and gum for use.  

Black or brown inks were usually preferred for writing texts, but inks in other colors appear as well. In the last two pages of the Qur’an in FIG. 14, the illuminator, Nur al-Din, signed his name in white ink and has elaborated the verse stops with red, green, and blue. Inks made of gold and silver were also used to stunning effect. The two primary methods to apply gold to a paper surface involved either fixing it in leaf form to a sticky surface, or pulverizing it into powder that could be used in solution as ink or paint.  

To contain liquid ink, an inkwell needs, at a minimum, a vessel with a bottom and sides, and maybe a lid to keep the ink from drying out. The independent form of the Arabic letter nun — ﷼ — forms a perfect little pot to hold ink, and it even has a diacritical mark to serve as the lid. That the letter nun is the first character in chapter sixty-eight
of the Qur'an ("Nun. I call to witness the Pen and what they inscribe") inspired the notion that this opening phrase alluded to the primordial pen and inkwell. It could only have delighted calligraphers that God affirmed the validity of the Prophet Muhammad’s role and testified to his exalted character, following mention of their tools.

Most surviving inkwells were incorporated into pen cases, either on the inside or attached as a sidecar. However, inkwells that, like the Qur’anic letter nun, stand alone (fig. 15) were also made. This dome-shaped inkwell is crafted of panels of warm-toned mother-of-pearl. The oculus is a flower with a ring punch in the center. Ring punches decorate the brass bands that secure the nacre panels and form the clasp. Whatever sort of inkwell he used and however he transported it, the calligrapher had to take care not to spill the ink. To this end, it was customary to put an absorbent wad of raw silk or wool into the inkwell and saturate it with ink. This ball of fiber prevented the ink from sloshing about, imparted just the right amount of ink to the pen so that the calligrapher could write one letter per dip, and protected the nib from hitting a hard surface."

**FIGURE 15**
Domed inkwell, Turkey, 1800s, nacre with brass mounts, height 3.1 inches (7.9 cm).
PAPER

Because inferior paper could spoil a work of calligraphy, a considerable connoisseurship developed to judge the qualities of paper. If the paper were too absorbent, the ink would sink in; if too slippery, the pen would skitter over the surface; if too thin, the writing would show on the reverse side. An extensive, international trade in paper developed that allowed calligraphers to sort through and compare the properties of papers produced in far-flung regions. Those cities singled out for producing the finest papers vary over the centuries, even according to the writer. Yazir prefers papers from Dowlatabad in India and Bukhara in Central Asia. Mohamed Zakariya notes that by the late 1800s, most calligraphers used Western handmade papers.39

No matter the source of the paper, calligraphers expended considerable effort to modify papers for specific needs. Plain white paper was not recommended for anything but the most ephemeral writing, for it would quickly show dirt and discoloration and tire the eyes. Calligraphers compiled long lists of recipes for dyeing and tinting paper. The dyes could be administered via bath, sponge, or brush. Dye ingredients include vegetal and mineral substances, such as madder root, linden blossoms, tea, saffron, tobacco, onion peels, henna, the sour peel of pomegranates, verdigris, orpiment, and tin. The heightened sensitivity to color that these artists developed is suggested by the range of hues Yazir describes for just one color, in this case, yellow: canary straw, gold, light cream, cream, heavy cream, honey foam, and light melon. To protect these subtle tints, dyed papers had to be dried in the shade to avoid bleaching by the sun.

PAPER BURNISHERS

Once the desired color had been achieved, the paper had to be sealed. The calligrapher wanted the ink to sit on the surface of the paper, not sink into it, and he wanted to avoid snagging the grain of the paper as he pushed the pen across its surface. To this end, calligraphers sized and burnished their papers. Letters appeared crisper on burnished paper, and the polished surface allowed the ink to flow more smoothly. The paper was first wetted in a bath of size (usually made of starch or egg white), then allowed to dry on a rack or screen; sometimes the process was repeated. If the calligrapher wanted to produce aromatic papers, he could add musk, ambergris, or rosewater to the size.40

Once dry, the sized paper was burnished to eliminate any surface imperfections and to bring all elements in the paper into alignment. Calligraphers employed various tools to burnish paper, but generally sought a hard, even edge that could be guided with two hands in a back-and-forth motion (Fig. 16). The best paper burnishers were made of polished stone, such as agate, onyx, or jade. To do its work, the burnisher needed to be smooth, but not shiny or slippery. Perfectly suited to burnishing paper with two hands is the wood-handled tool, which is inset with polished jade. Burnishers shaped like an egg were made of glass: the egg needed to be large enough to be grasped comfortably by both hands for burnishing. Once burnished, paper was set aside to age for at least one year. The older the paper, the better it was to work with.41
To create papers flecked or dusted with gold or silver, the craftsman would take a sheet of paper that had been sized, but not yet burnished, and sprinkle over it particles of gold or silver leaf of the dimension desired. Another technique involved mixing finely ground particles into water that had been thickened with glue or gelatin, and then brushing the mixture over the paper. 42 Burnishing made the gold or silver adhere to the paper and shine. In some papers, the metallic flecks are large enough to be measured in millimeters; in others the gold is so finely ground and evenly distributed that it imparts a subtle but pervasive surface sheen.

**SCISSORS**

With the pen cut, the ink readied, and paper prepared, the calligrapher had one further task before he could begin writing: cutting the paper to the exact size and shape required for the work at hand. 43 Thus, a fine pair of scribe’s scissors was an essential part of a writing set (Fig. 17). Scissor blades were forged out of steel by a master cutter and then filed into shape by apprentices. The cutting edges were kept matte, rather than shiny, and they were used only to cut very fine paper. To cut thicker paper, cardboard, or leather, one used shears (Fig. 22).

Gold overlay was also used for scissors. Most of the scissors decorated in this fashion are covered with a profusion of scrolling vines and leaves. One set of scissors (fourth from left), probably made in Iran, has both incised and overlaid decoration. A small cartouche, just at the fork of the handles, encloses a small scene of a falcon seizing a long-necked bird in its talons.

The compact little scissors that resemble a dart when closed were a specialty of Iranian scissors makers and were small enough to fit into a pen box. The openings for finger and thumb are shaped differently and nestle one above the other in a cunning fashion when closed. The two examples in Fig. 17 are beautifully decorated. On one set, a swirling floral pattern has been chased in relief. The other set has an openwork design involving three overlapping oges. Delicate openwork designs in steel had been a specialty of Iranian metalworkers since the 1500s. After drawing the design onto the steel surface, the metalworker pierced the areas that he wanted to be openwork with a bow drill; then he used a fretsaw and files to enlarge and refine the negative spaces of the pattern. 44

The form of scissors preferred by Turkish calligraphers had long, hollowed-out blades. The handles might be of a single piece with the blades, or formed separately and attached. Various decorative treatments evolved for the finger holes, including almond shapes, faceted ovals, or perfect circles. Particularly ingenious are the scissors with finger holes that are hinged to accommodate different finger thicknesses (second from the right).

Perhaps the most striking scissors are those in which the finger holes and handles have been transformed into a calligraphic formula that spells one of the “Beautiful Names
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