

THE CONSERVATION LABORATORY

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Unrolling an ancient Egyptian papyrus scroll that has not been read in thousands of years is an exciting and rare experience for both Egyptologist and conservator. This year two scrolls—marriage settlements of the Ptolemaic Period—that had been in the Museum collection for many years were brought down to the Conservation Laboratory by Dr. Hughes to be unrolled.

The scrolls, which owe their survival to the dry Egyptian climate, were embrittled by age. The top and bottom edges and the outer layers (consisting of the first twelve inches of one scroll) had broken off and slipped inside the remaining spirals of the scroll. Insects had eaten pathways through several layers, considerably weakening the remaining areas. In this brittle and damaged state, the scrolls could not be unrolled without causing further breakage. But by placing the scrolls in a humidity chamber—a relatively airtight plastic enclosure containing a beaker of deionized water to achieve a humidity of 80%—the papyrus fibers were able to absorb moisture and relax allowing several inches of scroll to be easily unrolled and then flattened between blotting paper and glass. In this way, six to eight inches of scroll could be carefully unrolled after an hour in the high humidity. When the scroll had been completely flattened and allowed to dry, the

broken fragments were matched together by color and by aligning individual fibers, and repairs were made using rice paper patches and rice paste.

Papyrus, from which we derive the word "paper," was developed in Egypt as a writing material some time before 3000 B.C., and at the height of its use during the Ptolemaic Period, the library at Alexandria was reported to possess over 800,000 scrolls on such subjects as science, history, literature, and religion in its collection. Its use was wide-spread in the ancient world, but by the first century A.D., parchment and vellum were beginning to replace papyrus; these in turn were superseded by paper, invented by the Chinese and introduced into the West through the Arab world in the twelfth century. With the decline and eventual abandonment of papyrus, the method of its manufacture—except for a brief and inaccurate first century A.D. account left by Pliny—was lost. There is no ancient Egyptian record detailing the technique, and it is thought that perhaps its great economic importance as an export made it a well-kept secret. For although the plant was introduced into Syria, Cyprus, and other Mediterranean areas, there is no evidence of wide-spread papyrus cultivation and manufacture outside Egypt.

The papyrus plant itself is thought not to be native to Egypt but to originate in the upper region of the White Nile in the Sudan and to have been carried into Egypt during the flooding of the Nile. A perennial, quickly propagating by root growth, it reaches its full height of ten to fifteen feet in one year; the stem is triangular and is topped by an umbrella-like tassel. It was cultivated in the marshy areas of the Nile to be used for boats, cloth, rope, food, medicine (the ash was used to treat ulcers and eye diseases), cartonnage for coffins and mummy masks, and sandals for the wealthy and priests (who would only wear papyrus sandals). As a decorative element, it played a prominent role in art and architecture. It was also used as an ornament on altars and offering tables and for funerals. But it was in the manufacture of papyrus sheets for writing that this plant was most valuable.

Modern researchers in England and Egypt have been able to duplicate the ancient product using two slightly different methods: the outer rind of the plant is peeled away and the triangular-shaped pith is cut or pulled lengthwise into thin strips which are placed side by side; a second layer is placed at right angles over the first and a cloth laid over this. The two layers are then either beaten or pressed to achieve a flat sheet. Binding of the strips is thought to occur either from the

natural saps present in the plant acting as a glue or from the barbs on the fibers interlocking during pressing.

Papyrus sheets were mass-produced and the size of the sheet varied according to its use, e.g. as a literary or religious text or as a legal document. Individual sheets were overlapped and joined together with a starch paste to make a long scroll which could be shortened or lengthened according to need. The scroll was rolled with the horizontal fibers on the inside, thereby minimizing stress on the papyrus.

(The preceding historical and technical information is taken from *The Nature and Making of Papyrus*, The Elmete Press, Yorkshire, England, 1973).

The Institute scrolls were successfully unrolled, repaired, and mounted and are now being studied by Dr. Hughes. In the Museum on exhibit are three scrolls, one completely unrolled and two which have yet to yield up their secrets.