

From papyrus roll to papyrus codex

Some technical aspects of the ancient book fabrication*

by *A. Wouters*

'The greatest benefactors of mankind are unsung and unknown: the inventor of the wheel, the deviser of the alphabet. Among their number we should place the inventor of the codex'. Thus the late Sir Eric Turner opened in 1977 his stimulating book 'The Typology of the Early Codex'¹. And, indeed, the origin of the modern book form — according to many the greatest revolution in the history of civilisation before printing — remains a mystery even today, although some facts are indisputable and several hypotheses have been put forward.

First a few facts. As a writing vehicle the codex was preceded by the roll. It derived from bound and waxed wooden writing tablets used as notebooks and it became the standard book form only in the 4th century A.D. The codex gave easier reference and had a clear space-saving advantage in comparison with the roll. T.C. Skeat², for example has calculated that the total length of the 104 leaves in the Chester Beatty codex of the Pauline Epistles *P. Beatty II* (200-250 A.D.)³ would be 1,570 cm, and that, if the same text had been written on a roll, a total width of 2,392 cm would have been needed. This implies a saving of about 44% with the codex form. Finally, the papyrus documentation shows that, already in the 2nd century A.D.⁴, the codex was an especially Christian book form.

Research in past decades concentrated mainly on the question why the Christians adopted this codex, especially the papyrus codex, for their writings. *Grosso modo* three theories originated, some of which, although in the meantime contradicted with strong arguments, are still put forward with flat assurance in most recent publications^{4a}. The sociological theory⁵, going back ultimately to Wilhelm Schubart⁶, some seventy years ago, holds that because the early Christians belonged to the lower classes, they preferred for their writings the humble form of the notebook to the classic roll⁷. Then there are two historico-geographical hypotheses, a Western one and an Eastern one, respectively. The Western theory, defended in Colin H. Roberts' classic paper 'The Codex' of 1954⁸, assumes that St. Mark's gospel, written in Rome in or shortly after A.D. 70, reached Alexandria in a parchment notebook. When it

was recopied in Egypt, the book form was kept, but the material changed into papyrus⁹.

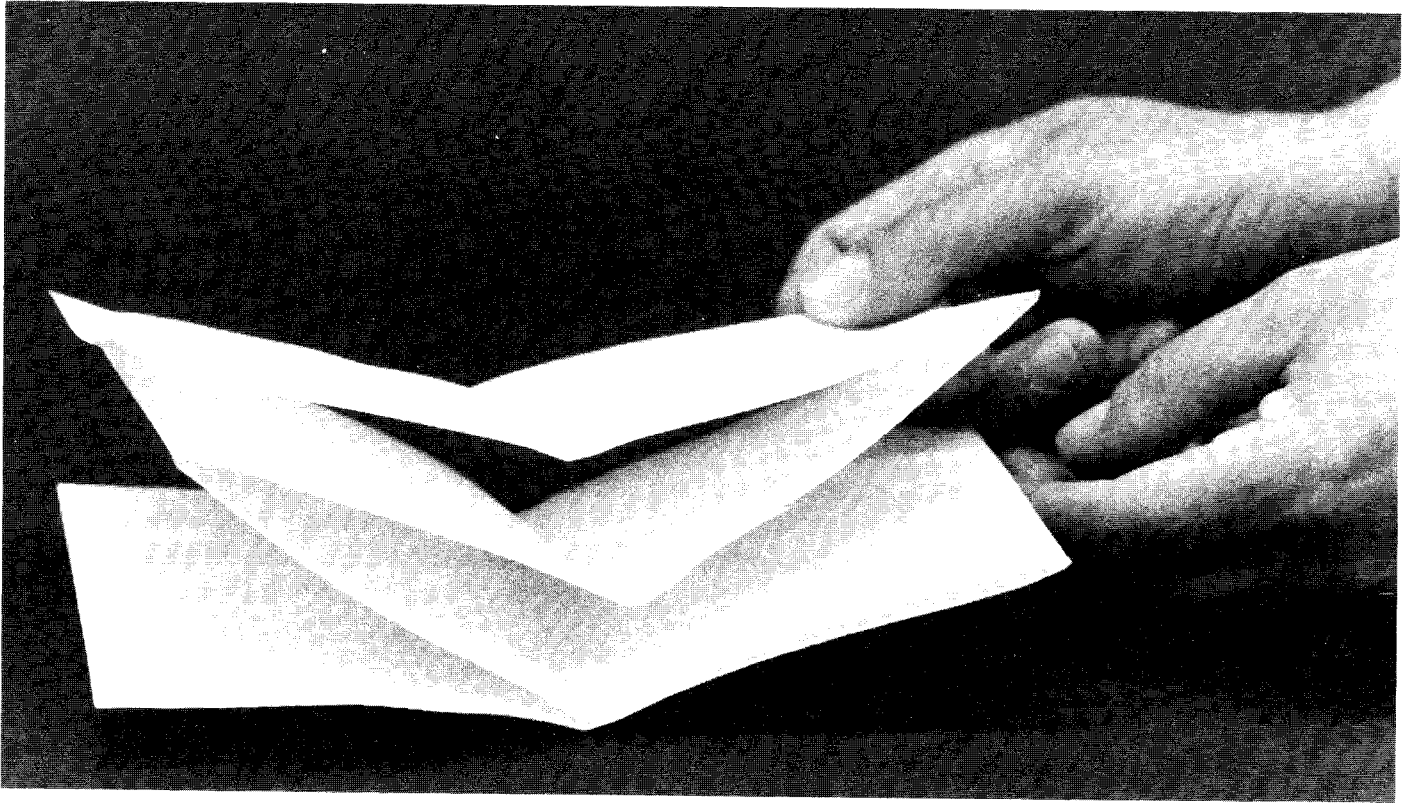
This idea has not been maintained in the successor to Roberts' paper, namely his joint monograph with T.C. Skeat, *The Birth of the Codex*, published in 1983¹⁰. Now they posit that Christians in the East adopted the Jewish habit of writing the oral law in bound tablets or leaves, as opposed to the rolls used for the written law, and that from such *pinakes*, in which Jesus' disciples recorded their master's sayings, developed the primitive codex. However, some objections have already been raised against this Eastern origin also, namely, by Peter J. Parsons¹¹, Colette Sirat¹², and by Joseph Van Haelst in his paper 'La naissance du codex' presented at a congress on 'Les débuts du codex' held in Paris in July 1985. In this paper¹³ the latter scholar even rejects that Christians were the inventors of the codex and prefers a pagan origin.

In view of this, the reader will understand that, contrary to what, at first glance, the first part of my title may suggest, I do not want to enter into this debate, to which I could not, for that matter, add a single new argument.

Besides the obscure origin of the codex-form, there is the equally debated question of the manufacturing process of the ancient papyrus codex. To understand perfectly how such a codex was constructed, we would need a lot of well-preserved examples which, in addition, were subjected to a thorough codicological analysis. Neither condition has been completely fulfilled at this moment, I may say.

In this paper I will treat of a particular Chester Beatty codex, the *Ac. 1499*, which in its present state can hardly be called well preserved, but which I have hypothetically restored in its original form with great plausibility, I believe. I will try to explain some at first sight striking peculiarities of its composition, some of which are still unparalleled in the papyrus books that have been codicologically examined, to my knowledge at least.

I emphasize from the start that I do not wish to imply that all the papyrus codices of the same period were manufactured in the same way as the *Ac. 1499*.



The construction of the D-quire.

Nevertheless, I believe that the construction process discussed here must be taken into account as a theoretical possibility by scholars examining isolated fragments from damaged codices and trying to figure out the physical make-up of these codices.

I also want to stress at once that to a very large degree I owe my knowledge of the subject to the work done by the late Sir Eric Turner and still more to the publications and the numerous oral comments of Prof. James Robinson. I am convinced that he is the scholar whose systematic explanations of his empirical observations about the Nag Hammadi codices, building further upon the knowledge acquired by Hugo Ibscher^{13a} and E.G. Turner, made papyrus codicology into a real science.

Let me first provide some brief information about this codex, its possible provenance, the way it came into Sir Chester Beatty's collection, and, finally, its date and contents.

In the Library little or no direct information is available about the date and source of acquisition. Prof. Robinson, who in the recent years has retraced the provenance of the Bodmer papyri¹⁴, found out that early in the fifties both Martin Bodmer in Geneva and Sir Alfred Chester Beatty were provided with ancient codices by the same dealer, Phocion J. Tano, and that several of the Bodmer papyri and of the Chester Beatty texts were part of the same find, late in 1952, at Abu Manu, not far from Nag Hammadi.

Very probably, though it is not absolutely certain, the *Ac.* 1499 was also part of that find. The codex was bought by Chester Beatty early in 1956. It was inspec-

ted in June of that year by Mr. T.C. Skeat and at that same period in London by the Belgian specialist in early bookbindings, the late Miss Berthe Van Regemorter, who as we shall see later on, was very much impressed by the fact that one of the blank quires in the codex had not been completely cut open. Also in London, in the British Museum, the written pages were taken out of the codex and mounted between glass by Mr. Stanley Baker. The unscribed quires and leaves and the covers of the binding, which were broken apart, were stored in the strong room of the Library. The *Ac.* 1499, which on the basis of the handwriting I have dated about 400 A.D., with a certain latitude of course, contains a Greek grammar, a Greek-Latin lexicon and a Latin calligraphic alphabet. The Greek grammar, that is to say, extensive conjugation tables of some Greek model verbs (ποιῶ, χρυσῶ, βοῶ and πλέκω) inflected in all possible persons, tenses and voices provides a lot of new information about Greek grammatical science and practice in antiquity. I found that the lexicon is based on the Epistles of Saint Paul. From a current text of *2 Cor.*, *Rom.*, *Gal.*, and *Eph.* the author selected each time a lemma and added a corresponding part of a current Latin text of the Epistles.

The latter was clearly a *Vetus Latina* copy and the codex furnishes numerous new readings. The technique applied by the author of the codex for learning a foreign language, Latin, is as yet unparalleled.

But, as mentioned, it is not the contents of this interesting papyrus book that I want to discuss here, nor the puzzling question as to what inspired the

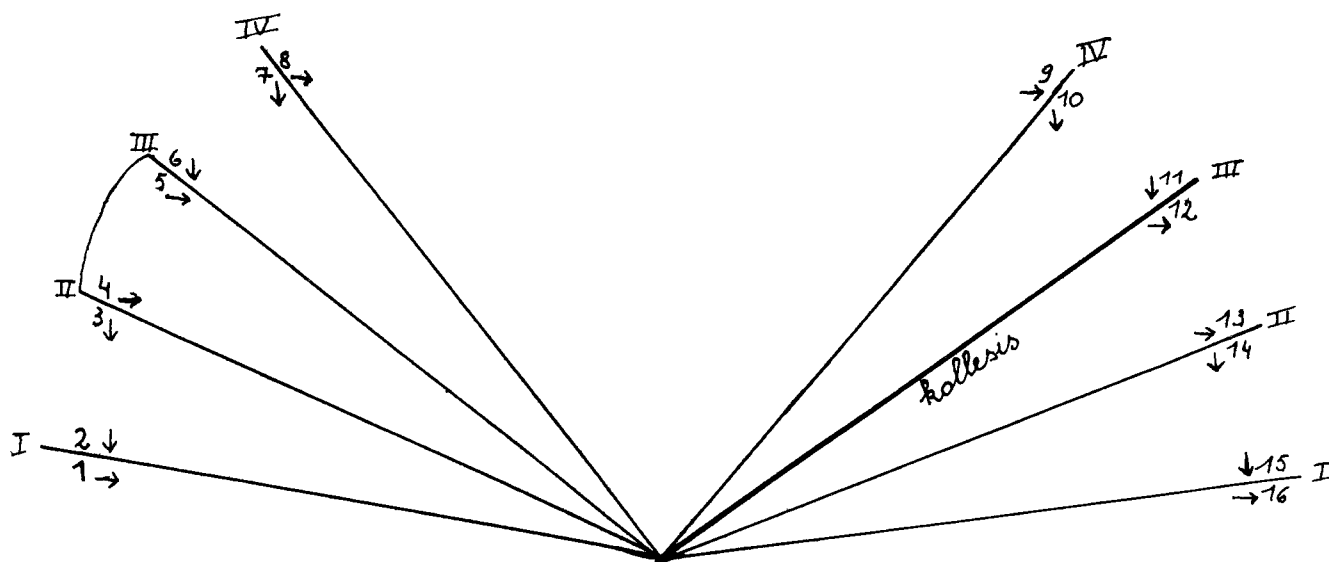


Diagram No. 1: the D-quire

1, 2 ...: pages in the quire
 I, II ...: sheets of papyrus of which the quire is composed

→ : horizontal fibre direction
 ↓ : vertical fibre direction

scribe to practice Greek grammar and to try to learn Latin in the same book. Instead I want to focus on the codicological aspects of the book, which may enlarge our knowledge of the manufacturing process of ancient papyrus codices. Because several of the topics I want to clarify are rather technical — hence the second part of my title — I will try to illustrate them by some drawings.

In the Library 16 leaves of papyrus, constituting 32 pages, have been put in pairs between glass. Nine of the pages are blank. Let me be clear at once about the terms I shall have to use further on. A sheet in a papyrus codex consists of two conjugate leaves which meet at the fold, thus producing four pages.

In the strong room 34 blank leaves of the original codex are kept, among them 3 undamaged quires, one of 5 sheets, (I called it the A-quire) and two of 4 sheets (called B- and D-quire, respectively). A fourth quire, the C-quire, at present has 3 sheets, but I assume that a written sheet has been taken out to be put between glass. There are also 2 separate leaves. On the basis of the contents of the text, *i.e.* the order in the grammar and the sequence in the lexicon — Prof. Robinson would call it 'philological' considerations, I believe — I have been able to reconstruct at least one quire (called G-quire) out of part of the written leaves now between glass. I will not go into detail about this reconstruction here. It is argued extensively in the first chapter of my edition¹⁵.

Now, in one of the two blank quires of four sheets — in my numbering called the D-quire — two of the leaves are still connected at the fore-edge (see diagram No. 1).

Evidently, it was this detail that caught Miss van Regemorter's attention and in a short article published in 1960¹⁶, she inferred that such a crease at the fore-

edge can only be obtained by folding a large sheet of papyrus into eight. Because the leaves of the codex are about 16.8 cm high by 13.6 cm broad, the original sheet from which this D-quire had been manufactured would have measured at least ca. 33.6 cm high by 54.4 cm. broad.

In the conclusion Berthe Van Regemorter drew from her observation, there seemed to be no less than three novelties:

(1) We would have to accept that the system of 'imposition' practiced by present-day printers and already applied in the earliest printings and even before in mediaeval hand-written parchment manuscripts¹⁷, was already applied for the construction of the quires of *Ac.* 1499. This would be the first and only certain attestation for a papyrus codex¹⁸.

(2) For the fabrication of this codex, specially prepared sheets were used.

(3) Ancient craftsmen were able to fabricate papyrus sheets with dimensions of at least 33.6 cm. by 54.4 cm.

For the moment I will concentrate on points 2 and 3, which are closely interrelated, in fact.

It has been accepted for some time that in general the material for the fabrication of a papyrus codex was taken from papyrus rolls. it may be useful to recall briefly how a papyrus roll was made, a manufacturing process with a tradition of millennia¹⁹ and continued till long into Arab times²⁰. The production of its basic units, the sheets, *χάρται* in Greek, was described in detail by the Roman author Pliny, in his *Naturalis Historia* XIII 74-82²¹. The manufacturer proceeded by laying thin strips of the pith of the stalk of a papyrus plant vertically side by side on a smooth surface. A second layer was superimposed horizontally at right angles to the lower layer. When pressed, dried

and rubbed up one got the basic writing surface, called a *kollema*. Several *kollemata*, according to Pliny twenty, but sometimes even fifty of seventy²², were pasted together side by side into a roll. The overlapping part, clearly visible, especially when not covered with writing, is called a *kollesis* or join. The joins were pasted in a consistent fashion throughout the roll, so that the scribe, if he held the roll correctly, would find each sheet overlapping its successor; and so he could write across each join without any resistance to the pen, which would go 'downhill'.

By contrast, no ancient information is available about the construction of a papyrus codex. One could suppose that the manufacturer fabricated special separate sheets not yet pasted together, so that one would not need to cut up a roll. In fact, already in the 1930's Hugo Ibscher²³ stated that for the sheets (conjugate leaves) of a papyrus codex, rolls were cannibalised. Several papyrus codices show *kolleseis* and continuity of fibres from one sheet to another. The manufacture of the quires of the Nag Hammadi codices from rolls was investigated scrupulously by James Robinson²⁴.

Only the Manichaean codices (4th-5th centuries A.D.) from Madinet Madi seem to be an exception. Hugo Ibscher²⁵ stated that for these books separate sheets were produced so that no *kolleseis* would hamper the writing. This could point to the unusual importance the Manichaeans attached to their books, which were 'éditions de luxe'. However, already in 1977 Eric G. Turner²⁶ suggested that the manufacturer could have cut out the *kolleseis* in fabricating the sheets from rolls, and in 1987, in a preliminary article about the codicology of *Ac. 1499*²⁷, James Robinson and I pointed out that in any case Ibscher did not record having sought in vain for fibre continuity from sheet to sheet, which would, if present, refute his hypothesis.

But let me return to the measurements of the original sheet conjectured by Berthe van Regemorter. In his *Typology of the Early Codex* of 1977²⁸ Eric G. Turner concluded on the basis of his inspection of a lot of papyri that in the Roman period the normal height of a *kollema* was about 28-30 cm and the normal breadth below 20 cm. The greatest height known to him was 46 cm and the greatest breadth 33 cm²⁹. He was, of course, aware of van Regemorter's article and he mentioned the *Ac. 1499*³⁰ as a puzzle needing clarification. In fact, his claim about the maximum breadth of a *kollema* cannot stand, as Turner recognized himself one year later³¹. As James Robinson³² has shown, in the Nag Hammadi codices there are no less than 59 *kollemata* and 6 in the Gnostic codex *P. Berol. 8502* that exceed 50 cm. In the *Nag Hammadi codex II* one *kollema* even measures 162,5 cm and there is one of 153,9 cm in the Berlin papyrus. This may be less exceptional than W.E.H. Cockle rather categorically stated in 1983³³ regarding the Nag Hammadi codex. The Mississippi Coptic codex³⁴ of the third century

A.D., belonging to the same discovery as the Bodmer codices, was made from 4 rolls. The exact measurements of three *kollemata* in these rolls could be determined and they all exceed greatly one metre in breadth³⁵. In addition, R. Kasser and G. Cavallo calculated in 1984, in their codicological description of *Papyrus Bodmer XXIX (Vision of Dorotheos)*³⁶ a codex of the same date as *Ac. 1499* and possibly of the same provenance³⁷, that the roll used for the conjugate leaves of this single quire codex had *kollemata* of 105 to 115 cm broad. Both papyrologists concluded from these measurements that this roll had possibly been manufactured with the special purpose of furnishing the material for a codex, and not for use as a volumen³⁸.

Now, van Regemorter's whole explanation collapses with the simple observation that there is a *kollesis* in sheet III, page 12 —> of this gathering (see diagram no. 1, *supra*). This join proves that the quire was manufactured from a roll and cannot be considered as an example of the imposition technique.

But how, then, are we to explain that in this quire, sheet III is still attached to sheet II?

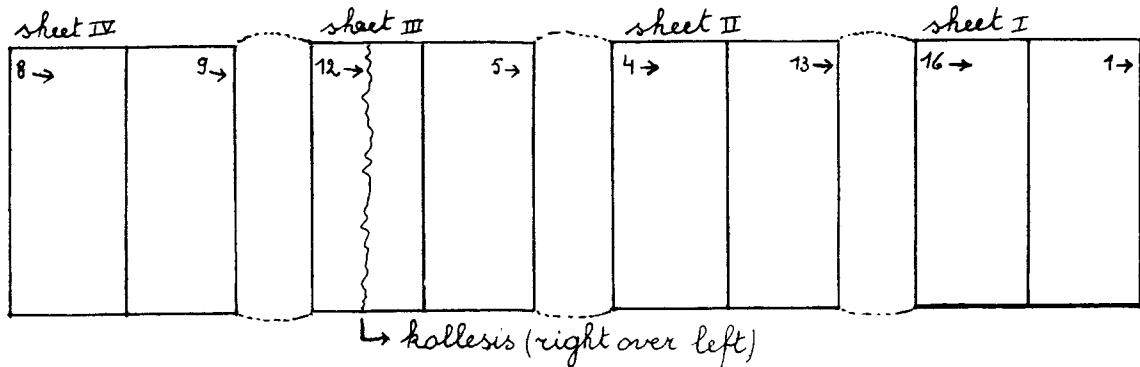
James Robinson's codicological investigations into the Nag Hammadi books³⁹ showed that a roll to be used in a quire was placed with the horizontal fibres upward, that it was usually cut from right to left, and that the sheets were stacked in the sequence in which they were cut. Then the pile was folded at the middle and the quire was ready. Thus it is usually possible to trace the horizontal fibres of a *kollema* from one leaf across the fold to its conjugate leaf, *i.e.* across the breadth of a sheet, and then from the left edge of one sheet to the right edge of the next sheet above it in the stack.

This fabrication technique normally results in a quire in which a page with vertical fibres faces each time a page with horizontal fibres; this is not the case in *Ac. 1499*, where like faces like. However, the manufacturer could, of course, turn over alternate sheets in the stack, as was apparently done in *Bodmer Papyrus II (P66)*, a codex of St. John (200-250 A.D.)⁴⁰, and in *Nag Hammadi codex XII*⁴¹, where facing pages have identical fibre direction. Still, this technique could not explain the connected leaves of the D-quire in *Ac. 1499*.

A possible solution which Professor Robinson suggested to me a few years ago and which we presented in a joint article in the 1987 Roca-Puig Festschrift, was that the manufacturer could have folded a roll accordion-like, rather than cutting it, and then, when the flat quire had been folded down the middle at the book's spine and bound in, the stationer could have trimmed the leading edge of the whole book and thus have cut free all the still folded leading edges, except where the fold had been poorly placed. Apparently then the two still connected leaves were unusually narrow, too narrow to have been cut from each other when the stationer cut the leading edge.

Only clear fibre continuations between the different sheets of the D-quire could bring proof of this working hypothesis. Recently I checked it, first on the D-quire. Fibre continuations proved that in the original roll the sheets had been in the following position:

The manufacturer must have taken this roll, turned it 180° in a vertical plane⁴², laid it with its → side (horizontal fibres) downward and folded it back and forth in an accordion-like manner, and then folded the flat quire in two. One could, of course, think of a



.....: fibre continuations

or

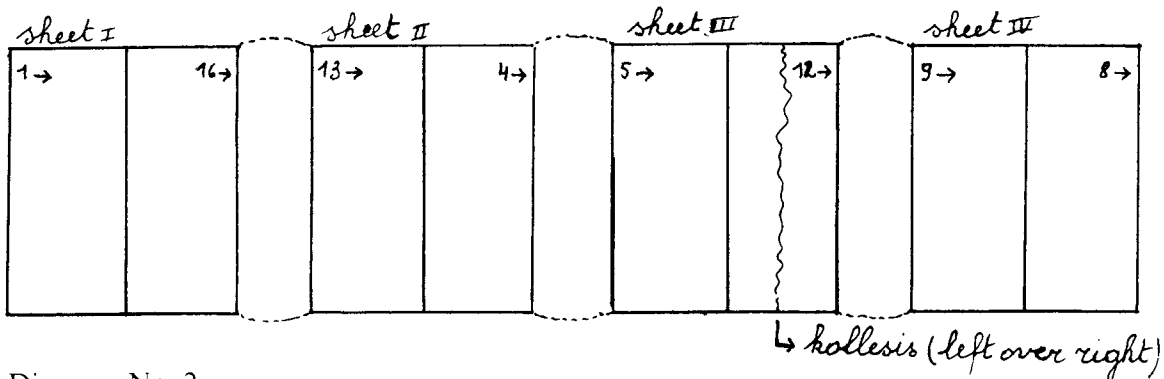


Diagram No. 2.

different initial position of the roll, so that no turning over in a vertical plane was needed.

With both methods the manufacturer obtained a quire with horizontal fibres on the two outward pages and with facing pages always presenting the same fibre direction. Sheet I became the outside sheet of the quire, sheet IV the central sheet.

The working hypothesis assumed that the stationer must have trimmed flush the edge when all the quires were finished and bound together. Sheets II and III must have escaped the trimming. In the present state of the quire they are not narrower than the other leaves, but this does not prove that they were not originally. They might have escaped the trimming by a fraction of a millimeter only.

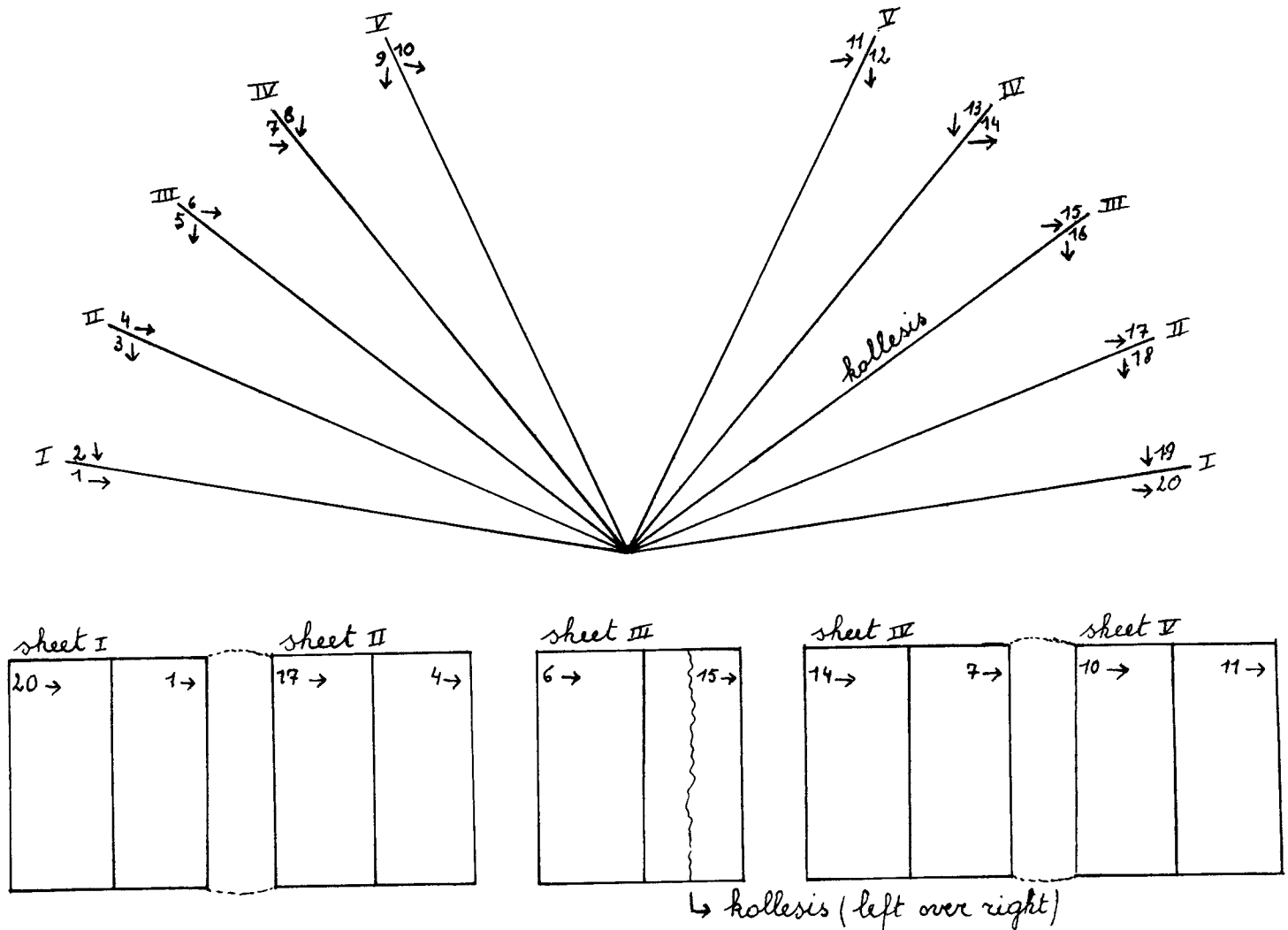
I also checked the accordion-like model on the other blank quires. It became obvious that the B-quire of 4 sheets was constructed from (part of) a roll of about 108 cm in length, apparently without any *kollisis*. The roll has been handled in exactly the same way as the one used for the D-quire. Since the C-quire is incomplete, as already mentioned, and since I have not yet been able to detect among the written leaves the one belonging to it, the testing did not work here.

For the blank A-quire, which consists of 5 sheets, the accordion theory at first glance does not seem to work.

As is apparent from diagram No. 3, the system whereby horizontal fibres faced horizontal fibres and vertical fibres vertical ones is interrupted here^{42a}. On the other hand, it is impossible that sheet III got into the wrong position after the dismantling of the codex in the British Museum. The quire is undamaged and the sheets are even still connected at the middle by a piece of string. I found fibre continuations between sheets I and II and, on the other hand, between sheets IV and V. I saw no clear continuity between sheets II and III, nor between III and IV.

How can we explain the break in the like facing like system in this quire, if we accept a priori that the same fabrication technique has been used here? It is clear that the explanation usable for other papyrus codices where a similar mistake in the like facing like system occurs, namely, that a careless scribe mistook the order of the isolated sheets⁴³, will not do here.

Let us suppose that the manufacturer took the first two sheets (I and II; still connected) from a first roll, turned them 180° in a vertical plane and then folded



.....: fibre continuations

Diagram No. 3: the A-quire

sheet II to the left over sheet I, which by then was with its \rightarrow side downward. Then he had to start a new roll, which was as usual in front of him with the \rightarrow side upward. He forgot to turn this roll in a vertical plane. He folded sheets IV and V to the left over sheet III and then folded sheet V again to the right. Then he placed this little accordion-like stack on top of the first one (sheets I and II) so that sheet III \downarrow was on top of sheet II \rightarrow . Finally the whole stack was folded at the middle. I am conscious that this is only a hypothesis, but the assumption that the manufacturer had to start a new roll within the quire might explain at the same time why, by inadvertence, he abandoned his normal system of 4 sheets (or 8 leaves) in this quire and produced one of 5 sheets (or 10 leaves)⁴⁴.

Because the leaves of the written G-quire, which I reconstructed, are now between glass, the testing of the fibre-continuity is extremely difficult, if not impossible. I could not get unambiguous results here, but at least, when I had put the leaves (within the frames) in the position which they should have occupied in the roll according to the accordion- or concertina-thesis, I

indeed had the clear impression of seeing one long papyrus roll.

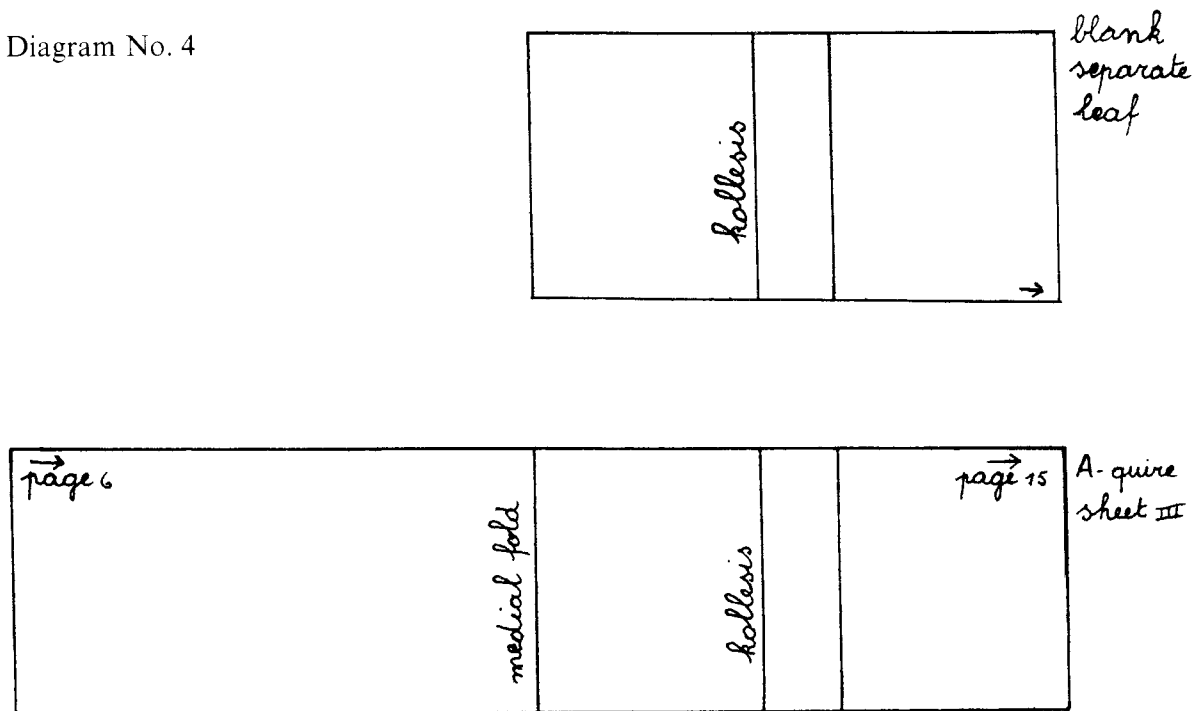
Thus it has become clear: (1) that the quires of *Ac.* 1499 were made from rolls; and (2) that a very special fabrication technique was applied which, to my knowledge, is as yet unparalleled.

I do not think that this fabrication technique in concertina fashion can shed any light on the transition from the roll to the codex as a writing vehicle⁴⁵. But it is clear that, once the codex form was in general use, it was an easy way for the manufacturer to obtain, starting from a roll, sheets with equal breadth and quires in which pages with identical fibre direction face each other.

In his codicological analysis of the Nag Hammadi books James Robinson⁴⁶ was able to determine with certainty for most of the codices (not IV, X, XII and XIII) the number of rolls used as well as their measurements. Till now, I have not succeeded in obtaining similar detailed results for the *Ac.* 1499 and I am not certain that I ever will.

Nevertheless, I must mention here another interest-

Diagram No. 4



ing point concerning the original rolls of the Chester Beatty codex. Among the unwritten, unglassed material there are, as already mentioned, two separate leaves, whose position in the original codex I have not yet been able to determine. One of them presents a *kollesis* that can be aligned with the *kollesis* in the A-quire in such a way that the vertical fibres run on from one leaf to the other.

It is obvious that a roll of about 33.6 cm high — a very usual figure in the Roman period⁴⁷ — was cut in two lengthwise, thus providing two shorter rolls which were used to produce a quire. Possibly, further searching for vertical fibre continuity between other leaves — a time-consuming business, as one may conceive — will allow me to detect more half-rolls. It would be strange, I believe, if the use of half rolls had been limited to one quire of the codex.

In contrast to the folding of rolls in concertina fashion, the use of half-rolls for the manufacture of a codex was not unknown, although we have only one certain parallel, the single quire Achmimic Proverbs codex, *Ms. Berol. Oct. 987* (3rd-4th century A.D.), for which Hugo Ibscher⁴⁸ already in the 1920's concluded that it had been made from two rolls cut lengthwise. In fact, E.G. Turner⁴⁹ conjectured in 1978 that a similar lengthwise cutting of a roll in three or even four strips may have taken place for *P. Strasbourg I 6*, a documentary roll admittedly, of the mid-third century A.D. But his assumption seems weak, as it is certainly not based on vertical fibre continuation with (other) half-rolls. The only reason for his hypothesis seems to have been the strong contrast between height (only 11 cm) and breadth (36,5 cm) of the *kollemata* of this Strasbourg roll.

Before concluding I want to emphasize briefly that the *Ac. 1499* codex was clearly a ready-made note-

book bought (or manufactured) by the scribe before he started writing. The facts that only a relatively small number of pages (23 out of the 100) were inscribed, that several quires were left completely blank and that in the written quires blank pages figure among pages with text already make it very unlikely that the sheets were inscribed before they were stitched together into quires. The latter technique has apparently been applied in some other ancient papyrus codices⁵⁰ and was proclaimed by E.G. Turner⁵¹ to be the normal procedure, at least for a single quire codex. The concertina model in *Ac. 1499* completely excludes the possibility that the leaves had been written before the manufacture of the codex. We must therefore infer that around 400 A.D. there was a trade in ready-made papyrus codices. Certainly C.H. Roberts⁵² was incorrect when in 1954 he inferred from the fact that rolls were used for the construction of a codex that 'a blank papyrus codex could not be bought since the format was not recognized by the trade'. And I believe that E.G. Turner, who knew van Regemorter's statements about the blank quires and pages in *Ac. 1499*⁵³ — of course, he was not aware of the concertina model — was too scrupulous when in his *Typology*⁵⁴ he put such an open question as: 'could the scribe buy a codex ready-made'? In 1986 Leslie S.B. McCoull⁵⁵ stated that in the fourth century A.D. previously made-up blank papyrus codices were available for use in the administration. She used as evidence *P. Vindob. G. 39847*⁵⁶, a fourth-century (?) codex containing a number of accounts. It seems only logical to assume that the same manufacturer who provided the blank notebooks for the administration could also supply blank codices to be used by individuals. In fact this supposition seems to be confirmed now by Professor J. Gascou's recent study of the Egyptian documentary

codices. He communicated the results of his investigations in a paper 'Les codices documentaires Egyptiens' at the Paris congress on *Les débuts du codex*, which I have already mentioned⁵⁷, and he was so kind as to let me read through his manuscript prior to publication. J. Gascoy was able to distinguish a special fourth-century group of Christian literary codices made from rolls previously used as documents. These codices share all their material characteristics and their provenance with *P. Beatty Panopolis*, a codex containing tax documents dated from 339 A.D. to 346 A.D. He concluded: 'Une officine de Panopolis, au Bas-Empire, fabriquait des codices destinés indifféremment aux usages pratiques ou à la copie de textes chrétiens, à l'aide de rouleaux déclassés cédés par l'administration municipale'.⁵⁸

NOTES

* After I had submitted this paper, my complete edition of the Chester Beatty papyrus codex, which is discussed, has appeared (cf. *infra*, note 15). The text published here further elaborates some aspects of the technical description provided now also in my book (pp. 18-25: 'Physical characteristics of the codex'). I have also added some recent bibliographical references.

I thank my colleagues Adam Bülow-Jacobsen (Copenhagen), S. Emmel (New Haven), C. Vandersleyen (Louvain-la-Neuve), T.C. Skeat (London), W.J. Tait (Durham) and J. Van Haelst (Paris), who after reading through a first draft of this paper gave me good advice and saved me from several errors. W.J. Tait made also several corrections to my English.

For the references to papyri the generally accepted abbreviations have been employed. The complete bibliographical references can be found in e.g. E.G. Turner, *Greek Papyri. An Introduction*, Oxford, 1980², pp. 159-178, or J.J. Oates *et alii*, *Checklist of Editions of Greek Papyri and Ostraca*, Chico, 1985³. Pack² refers to R.A. Pack, *The Greek and Latin Literary Texts from Greco-Roman Egypt*, Second Revised and Enlarged Edition, Ann Arbor, 1965.

¹ University of Pennsylvania, 1977.

² 'The Length of the Standard Papyrus Roll and the Cost-Advantage of the Codex,' in: *Zeitschrift für Papyrologie und Epigraphik*, 45 (1982), pp. 169-175. Similar calculations have in the meanwhile been made for *Chester Beatty Codex IV: Numbers, Deuteronomy* (2nd-3rd century A.D.) by C.H. Roberts and T.C. Skeat, *The Birth of the Codex*, London, 1983, reprint, 1985, pp. 47-48.

³ Cf. J. Van Haelst, *Catalogue des Papyrus Littéraires Juifs et Chrétiens*, Paris, 1976, no. 497.

⁴ C.H. Roberts and T.C. Skeat, *The Birth of the Codex*, p. 47, stated: '(...) at the time when the Christians are presumed to have adopted the codex, viz. not later than 100 A.D.' In their list (pp. 40-41) of early Christian papyrus codices no exemplar from the 1st century A.D. occurs, however. See also M. McCormick, 'The Birth of the Codex and the Apostolic Life-Style,' in: *Scriptorium*, 39 (1985), p. 152, note 5. In fact, *P. Yale 1* (inv. 419), a fragment of a papyrus codex containing *Genesis XIV 5-8; 12-15*, has been dated by J.F. Oates, A.E. Samuel and C. Bradford Welles,

Yale Papyri in Beinecke Rare Book and Manuscript Library (American Studies in Papyrology, vol. 2), New Haven-Toronto, 1967, pp. 3-8, from about A.D. 90, but E.G. Turner preferred a date in the 2nd-3rd century A.D. Cf. C.H. Roberts and T.C. Skeat, *The Birth of the Codex*, p. 40. See also J. Van Haelst, *o.c.*, no. 12. For the sake of completeness I now also refer to a recent article of K.K. Young, 'Palaeographical dating of P. 46 to the later first century,' in: *Biblica*, 69 (1988), pp. 248-257, where the author tries to assign to the Chester Beatty and Michigan codex of the Pauline Epistles a very early date. I wonder whether he will convince the scientific world.

^{4a} A useful critical survey of the discussions is to be found now in W.W. Harris, 'Why did the Codex Supplant the Book-Roll?,' in: *Renaissance Society and Culture. Essays in Honor of Eugene F. Rice, Jr.*, edd. J. Monfasani and R.G. Musto, New York, 1991, pp. 71-85.

⁵ See e.g. G. Cavallo, 'Libro e pubblico alla fine del mondo antico,' in: *Libri, editori e pubblico nel mondo antico. Guida storica e critica*, Bari, 1975, pp. 84-85: 'Il codice è, insomma, il libro della letteratura popolare, cristiana e anche tecnica, comunque destinato alle classi subalterne e meno abbienti, di fronte al quale stava il rotolo, custode della grande arte letteraria, riservata ai soli fruitori in grado di apprezzare quell' arte, le élites sociali, tradizionalmente colte. A determinare il rinnovamento tecnologico del libro è dunque una spinta dal basso.' His opinion was taken over with approval by I. Gallo, *Avviamento alla papirologia greco-latina*, Napoli, 1983, p. 32. See now also the English translation of the latter monograph: *Greek and Latin Papyrology*, translated by M.R. Falivene and J.R. March (*Classical Handbooks 1*), Institute of Classical Studies, University of London, 1986, p. 14.

⁶ *Das Buch bei den Griechen und Römern*, zweite Auflage, Berlin-Leipzig, 1921, pp. 119 sqq. See p. 120: 'Der Kodex aber war damals das Buch der kleinen Leute.' Cf. also T. Kleberg, *Buchhandel und Verlagswesen in der Antike*, Darmstadt, 1967, p. 50.

⁷ Contra: C.H. Roberts, 'Books in the Graeco-Roman World and in the New Testament,' in: *The Cambridge History of the Bible*, vol. I, edd. P.R. Ackroyd and C.F. Evans, Cambridge, 1970, p. 58, and C.H. Roberts and T.C. Skeat, *The Birth of the Codex*, pp. 67-74.

⁸ In: *Proceedings of the British Academy*, 40 (1954), pp. 169-204.

⁹ Doubts already in T.C. Skeat, 'Early Christian Book-Production: Papyri and Manuscripts,' in: *The Cambridge History of the Bible*, vol. 2: *The West from the Fathers to the Reformation*, ed. G.W.H. Lampe, Cambridge, 1969, pp. 54-79; see pp. 71-72. C.H. Roberts' theory of 1954 was still mentioned without any reference to his later book (see note 2) by O. Mazal, *Lehrbuch der Handschriftenkunde (Elemente des Buch- und Bibliothekwesens)*, Edd. F. Dressler and G. Gattermann, Bd. 10), Wiesbaden, 1986, p. 67.

¹⁰ Cf. *supra*, note 2.

¹¹ In his review of C.H. Roberts and T.C. Skeat's book, in: *The Classical Quarterly*, 37 (1987), pp. 82-84.

¹² 'Le livre hébreu dans les premiers siècles de notre ère: le témoignage des textes,' in: *Calames et Cahiers. Mélanges de codicologie et de paléographie offerts à Léon Gilissen (Les Publications de Scriptorium, IX)*, Bruxelles, 1985, pp. 169-176; see p. 176: 'Il faut bien reconnaître cependant que l'hypothèse des sources juives pour le codex chrétien ne

s'appuie ni sur les textes ni sur l'archéologie.' The article has been reprinted now in A. Blanchard (ed.), *Les débuts du codex*. Actes de la journée d'étude organisée à Paris les 3 et 4 juillet 1985 par l'Institut de Papyrologie de la Sorbonne et l'Institut de Recherche et d'Histoire des Textes (*Bibliologia. Elementa ad Librorum Studia Pertinentia*, vol. 9.), Turnhout, 1989, pp. 115-124.

¹³ Now published in A. Blanchard (ed.), *Les débuts du codex* (see note 12), pp. 13-15. See p. 35: 'le codex est une invention exclusivement païenne et romaine.'

^{13a} 'Der Codex,' in: *Jahrbuch der Einbandkunst*, 4 (1937), pp. 3-25.

¹⁴ Cf. his paper in this volume 'The Pachomian Monastic Library at the Chester Beatty Library and the Bibliothèque Bodmer.' See also his *Introduction* in W. Brashear, W.P. Funk, J.M. Robinson and R. Smith, *The Chester Beatty Codex Ac 1390. Mathematical School Exercises and John 10:7-13:38* in Subachmimic (*Chester Beatty Monographs*, no. 13), Leuven-Paris, 1990, pp. 3-29. See, however, also the doubts expressed by R. Kasser, 'Status quaestionis 1988 sulla presunta origine dei cosiddetti Papiri Bodmer', in: *Aegyptus*, 68 (1988), pp. 191-194. According to J. Van Haelst's recent hypothesis the *Bodmer papyri* rather originate from a school in Akhmîn (Panopolis). Cf. R. Kasser (with the collaboration of G. Cavallo and J. Van Haelst), 'Nouvelle description du Codex des Visions', in A. Carlini, *Papyrus Bodmer XXXVIII: Erma: Il Pastore (Ia-IIIa visione)*, Cologny-Genève, 1991, p. 105, note 5.

¹⁵ This edition has meanwhile been published under the title: *The Chester Beatty Codex Ac. 1499. A Graeco-Latin Lexicon on the Pauline Epistles and a Greek Grammar* (*Chester Beatty Monographs*, no. 12), Leuven-Paris, 1988.

¹⁶ 'Le papetier-libraire en Egypte,' in: *Chronique d'Egypte*, (1960), pp. 278-280.

¹⁷ Cf. L. Gilissen, 'La composition des cahiers, le pliage du parchemin et l'imposition,' in: *Scriptorium*, 26 (1972), pp. 3-33; C. Samaran, 'Manuscripts "imposés" et manuscrits non coupés. Un nouvel exemple,' in: *Codices Manuscripti*, 2 (1976), pp. 38-42; J.D. Farquhar, 'The Manuscript as a Book,' in: S. Hindmann and J.D. Farquhar, *Penn to Press* (Exhibition Catalogue, University of Maryland, Art Department Gallery, Department of the History of Art), The Johns Hopkins University, 1977, pp. 11-99; see pp. 21 sqq.; P.F.J. Obbema, 'Writing on Uncut Sheets,' in: *Quaerendo. A Quarterly Journal from the Low Countries Devoted to Manuscripts and Printed Books*, 8/4 (1978), pp. 337-354; and G. Bozzacchi and M. Palma, 'La formazione del fascicolo nel codice altomedievale latino. Ipotesi e verifiche sperimentali,' in: *Scrittura e Civiltà*, 9 (1985), pp. 325-336.

Whether the imposition technique was already used in antiquity for the construction of the earliest parchment codices, as accepted apparently by W. Schubart, *Das Buch bei den Griechen und Römern*², p. 186, (concerning *P. Ryl.* 1.53, a Homer codex of the 3rd-4th century A.D.) and by F.G. Kenyon, *Books and Readers in Ancient Greece and Rome*, Oxford, 1932, pp. 101, 105-106, remains uncertain. See also E.G. Turner, *The Typology of the Early Codex*, pp. 44 and 99.

¹⁸ A similar claim had in fact been made already by W. Schubart, *Das Buch bei den Griechen und Römern*², pp. 127-128 (and notes on p. 186), for the Cairo Menander papyrus codex (inv. 43227) (4th-5th century A.D.) (cf. Pack² no. 1301), which consists of gatherings of 4 sheets

('quaterniones'): 'Unsere Bücher bestehen aus Bogen, d.h. aus grossen Papierstücken, die solange gefaltet werden, bis man die geforderte Blattgrösse erhält. Infolgedessen hängen die Buchblätter nicht nur an der Hefstelle, sondern auch an allen Faltungsstellen zusammen. Das Buch muss, wie wir zu sagen pflegen, aufgeschnitten werden, was in der Regel erst beim Einbinden geschieht. Für den Druck ist dieses Verfahren vorteilhaft: solange man aber darauf angewiesen war, den Buchtext mit der Hand zu schreiben, musste man etwas anders zu Werke gehen. Immerhin scheint es vorzukommen; im berühmten Menanderbuch in Kairo beginnen innerhalb der Lage Blatt 1 und 3 mit Rekto, 2 und 4 mit Verso, was sich am einfachsten erklärt, wenn man die Faltung eines grossen Papyrusbogens voraussetzt.'

E.G. Turner, *The Typology of the Early Codex*, pp. 43-44, rejected this theory: 'It is surely an aberration on the part of W. Schubart to suppose that we may account for the way in which in the Menander Cairo (...) horizontal fibres are on the right-hand pages of sheets 1 and 3 and vertical fibres are on the right-hand pages of sheets 2 and 4 by the supposition that a sheet four times as large was folded into four and cut. Assuming no damage, a single constituent sheet of this codex must measure 36 cm broad x 30 cm high. A sheet four times that size would be 1.44 m broad and 1.20 m high and it is a fantasy to suppose that papyrus manufacturers ever made a sheet like that.'

I think that E.G. Turner was wrong in his calculation of the measures of the eventual original sheet. To obtain a quire of 4 sheets, a 'quaternio', one must fold a large sheet in the middle, three times alternately. Because a leaf of this codex measures 18 cm (B) x 30 cm (H) (cf. E.G. Turner, *o.c.*, p. 112, no. *227) the original sheet needed to be only 60 cm x 72 cm.

Nevertheless, as it is unknown if there are any *kolleseis* in the quires of this codex, and, because, as far as I know, no checking of fibre continuation between the sheets has yet been undertaken, nothing certain can be said at this moment about the manufacture of this codex. As to the *kolleseis*, I saw none on the facsimiles published by G. Lefebvre, *Papyrus de Ménandre (Catalogue Général)*, Le Caire, 1911 and L. Koenen, *The Cairo Codex of Menander*, London, Institute of Classical Studies, 1978, but, of course, to be certain, one should have to inspect the original sheets. Let me add that F.G. Kenyon, *Books and Readers in Ancient Greece and Rome*, p. 10, excluded a priori the building of a quire by folding a sheet of papyrus several times alternately: 'Papyrus, however, was not tall enough to fold in more than one direction, and the same sheet could not be folded more than once without risk of splitting or tearing.'

¹⁹ Cf. J. Černý, *Paper and Books in Ancient Egypt*, Chicago, 1977.

²⁰ Cf. A. Grohmann, *Arabische Paläographie*, 1. Teil (*Österreichische Akademie der Wissenschaften, Phil.-Hist.-Klasse, Denkschriften*, 94. Band, 1. Abhandlung), Graz-Wien-Köln, 1967, pp. 66-93.

²¹ See the extensive comments on the Pliny text by N. Lewis, *Papyrus in Classical Antiquity*, Oxford, 1974, pp. 34-69. Cf. also now his additional remarks in N. Lewis, *Papyrus in Classical Antiquity. A Supplement (Papyrologica Bruxellensia*, 23), Bruxelles, 1989, pp. 15-33.

I.H.M. Hendriks, 'Pliny, Historia Naturalis XIII. 74-82 and the Manufacture of Papyrus,' in: *Zeitschrift für Papy-*

rologie und Epigraphik, 37 (1980), pp. 121-136, starting from the same Pliny text, assumes a process which consists in peeling off pieces cut from the stalk of the papyrus plant. His new theory was approved by E.G. Turner, 'An Open Letter to Dr. I. Hendriks,' in: *Zeitschrift für Papyrologie und Epigraphik*, 39 (1980), pp. 113-114, and by D. Holwerda, 'Plinius über die Anfertigung von "charta",' *ibid.*, 45 (1982), pp. 257-262. Objections have been formulated, however, by N. Lewis, 'Open Letter to I.H.M. Hendriks and E.G. Turner,' in: *Zeitschrift für Papyrologie und Epigraphik*, 42 (1981), pp. 293-4; W.E.H. Cockle, 'Restoring and Conserving Papyri,' in: *Bulletin of the Institute of Classical Studies*, 30 (1983), pp. 147-165, esp. pp. 148-149, and H. Harrauer - P.J. Sijpesteijn, *Neue Texte aus dem antiken Unterricht (Mitteilungen aus der Papyrussammlung der Österreichischen Nationalbibliothek, Papyrus Erzherzog Rainer, N.S., XV. Folge)*, Wien, 1985, p. 55 (in the comments to *P.Vindob.G.* 38843: 506.7 A.D.). In his contribution 'More about the Manufacture of Papyrus,' in: *Atti del XVII Congresso Internazionale di Papirologia*, vol. 1, Napoli 1984, pp. 31-37, I.H.M. Hendriks repeated his theory but added the supposition that 'Pliny gives an ideal description of the manufacturing process, but that other methods existed, including the method which uses strips to make papyrus' (p. 36). After reading Hendriks' first contribution of 1980, it occurred to me that it should be checked how far his description of the peeling off process is concordant with some earlier statements by A. Grohmann, 'Aperçu de papyrologie arabe,' in: *Etudes de Papyrologie*, 1 (1932), pp. 30-31, and *id.*, *Arabische Paläographie*, pp. 75-79 (Herstellung des Papyrus). I see now that in his paper of 1984 Hendriks is aware of Grohmann's thesis (cf. pp. 32-33). For a recent bibliography on the whole matter, see A. Bülow-Jacobsen, 'A Short Bibliography on Papyrus-Making,' in: M.L. Bierbrier (ed.), *Papyrus: Structure and Usage* (British Museum, Occasional Paper, no. 60), London, 1986, p. 90. One could add now: R.A. Coles, *The Rendel Harris Papyri of Woodbrooke College*, Birmingham, vol. II, Zutphen, 1985, pp. 119-120 (on strip construction); Giovanna Menci, 'Fabbricazione, uso e restauro antico del papiro: tre note in margine a Plinio, *N.H.* XIII 74-82,' in: *Proceedings of the XVIII International Congress of Papyrology, Athens 25-31 May 1986*, Athens, 1988, vol. II, pp. 497-504; H. Ragab, 'The Quality of the Recently Manufactured Papyrus as Compared with Ancient Egyptian Papyrus,' *ibid.*, pp. 513-523; A. Waltert, B.M. Moeliono and J.D. Kruijer, 'Mikroskopische Untersuchung von Papyrus und Plinius, *Historia Naturalis* XIII 74-83. Eine anatomisch-morphologische Studie,' in: *Zeitschrift für Papyrologie und Epigraphik* 76 (1989), pp. 39-44, and A.A. Nascimento, 'La fabrication du papyrus; une expérience pédagogique et quelques précisions techniques,' in: *Euphrosyne*, 16 (1988), pp. 323-326 (about an experiment conducted at Funchal, Madeira).

In E.G. Turner's *Greek Manuscripts of the Ancient World*, Second Edition, Revised and Enlarged, Edited by P.J. Parsons (*Bulletin of the Institute of Classical Studies, Supplement* 46), London, 1987, plate 1 shows the construction of a sheet of papyrus starting from horizontal and vertical strips. On plate 77 is illustrated the construction process according to Dr. Hendriks' theory.

²² Cf. E.G. Turner, *The Papyrologist at Work (Greek, Roman and Byzantine Monographs, no. 6)*, Duke University, Durham, 1973, p. 4.

²³ See *supra*, note 13a.

²⁴ J.M. Robinson, *et alii*, *The Facsimile Edition of the Nag Hammadi Codices. Introduction*, Leiden, 1984, pp. 61-70 (5. The *kollemata*).

²⁵ 'Die Handschrift,' in: C. Schmidt and H.J. Polotsky, *Ein Mani-Fund in Aegypten: Originalschriften des Mani und seiner Schüler (Sitzungsberichte der Preussischen Akademie der Wissenschaften, Phil.-Hist. Klasse, Part I)*, 1933, p. 84.

²⁶ *The Typology of the Early Codex*, pp. 46 and 50.

²⁷ 'Chester Beatty Accession Number 1499. A Preliminary Codicological Analysis,' in: *Miscel-lània Papirologica Ramon Roca-Puig*, Barcelona, 1987, p. 302. See already J.M. Robinson, *et alii*, *The Facsimile Edition of the Nag Hammadi Codices. Introduction*, p. 62.

²⁸ Pp. 44 and 50.

²⁹ Viz. *P. Oxv.* 37.2806 (2nd century A.D.), a roll of Cratinus, with a *kollema* of 32.5 cm broad. But in his later study, *The Terms Recto and Verso. The Anatomy of the Papyrus Roll (= Actes du XV^e Congrès International de Papyrologie, Première partie) (Papyrologica Bruxellensia, 16)*, Bruxelles, 1978, p. 61, E.G. Turner stated 'that E.W. Handley in an as yet unpublished paper (...) has shown that fragment II should be placed to the left of fragment I, and its horizontal fibres are identical: the sheet therefore may have been up to about 40 cm broad.'

³⁰ p. 47 and p. 54, note 11.

³¹ In *The Terms Recto and Verso. The Anatomy of the Papyrus Roll*, p. 62, E.G. Turner changed his earlier view and accepted that from the 4th century A.D. onwards one begins to see sheets of greater breadth.

³² *The Facsimile Edition of the Nag Hammadi Codices. Introduction*, pp. 67-70.

³³ *Restoring and Conserving Papyri*, p. 149.

³⁴ Cf. W.H. Willis, 'The New Collection of Papyri at the University of Mississippi,' in: *Proceedings of the 9th International Congress of Papyrology*, Oslo, 1961, pp. 383-389 and Plate V.

³⁵ See for the exact measurements, J.M. Robinson and A. Wouters, *Chester Beatty Accession Number 1499. A Preliminary Codicological Analysis*, p. 301.

³⁶ Cf. A. Hurst, O. Reverdin and J. Rudhardt, *Papyrus Bodmer XXIX, Vision de Dorotheos*, Cologny-Genève, 1984, pp. 99-120; appendix by R. Kasser and G. Cavallo, *Description et datation du Codex des Visions*. See p. 105. See now also R. Kasser, 'Nouvelle description du Codex des Visions' (cf. *supra*, note 14), pp. 111-112.

³⁷ Cf. R. Kasser and G. Cavallo, *o.c.*, p. 100: 'Découverts vraisemblablement par des paysans de Haute-Egypte, comme les autres manuscrits Bodmer du même lot.'

³⁸ In fact they take over a suggestion made already by E.G. Turner, *The Typology of the Early Codex*, p. 52 (in concern with the very broad *kollemata* in the Nag Hammadi codices), and to which J.M. Robinson, *et alii*, *The Facsimile Edition of the Nag Hammadi Codices. Introduction*, p. 65, reacted positively. However, a different explanation for the very broad *kollemata* in this codex has been proposed now by R. Kasser, 'Nouvelle description du Codex des Visions' (cf. *supra*, note 14), p. 112: "On a là éventuellement un produit manufacturé pour répondre à des exigences médiocres: en sectionnant ainsi ce rouleau sans en éliminer les zones défectueuses, on se contentait d'appliquer le procédé élémentaire aboutissant à la fabrication, non pas d'authentiques codex de librairie (pour les-

quels on exigeait un support d'écriture aussi régulier que possible), mais de simples codex à usage privé (cahiers d'écoliers par exemple)."

³⁹ J.M. Robinson, 'The Future of Papyrus Codicology,' in: R.McL. Wilson (ed.), *The Future of Coptic Studies* (Coptic Studies, I), Leiden, 1978, pp. 23-70; see p. 26; *Id.*, 'Codicological Analysis of Nag Hammadi Codices V and VI and Papyrus Berolinensis 8502,' in: *Nag Hammadi Studies X*, Leiden, 1979, pp. 14-15.

⁴⁰ Cf. E.G. Turner, *The Typology of the Early Codex*, pp. 4, 62, 66, and 70. Cf. J. Van Haelst, *Catalogue*, no. 426.

⁴¹ Cf. J.M. Robinson, et alii, *The Facsimile Edition of the Nag Hammadi Codices. Introduction*, p. 50.

⁴² The normal writing position of the roll was such that at the *kolleseis* the left-hand *kollema* overlaps the right-hand *kollema*. In the case of one roll (no. 1) of the Nag Hammadi Codex VII and in all the three rolls of *Papyrus Berolinensis 8502* the right-hand *kollema* overlaps the left-hand *kollema*. J.M. Robinson, *Codicological Analysis of the Nag Hammadi Codices V and VI and Papyrus Berolinensis 8502*, p. 36, and *Facsimile Edition of the Nag Hammadi Codices. Introduction*, pp. 46-47, explained this phenomenon by assuming that the rolls were laid in the usual position and were cut from right to left, after which the stack was rotated horizontally 180 degrees, thus producing the secondary appearance of having been cut from left to right.

^{42a} The original composition of the papyrus codex *P. Bon. 3+4* (IInd-IIIrd century A.D.) (= Pack² 645 and 1801), which contains a *Homeromanteion* and an hexameter poem, has been reconstructed now by F. Maltomini, 'P. Bon. 3+4: una nota codicologica,' in: *Zeitschrift für Papyrologie und Epigraphik*, 85 (1991), pp. 239-243. The codex shows a similar interruption in the like facing like system. See the diagram added by F. Maltomini, p. 240.

⁴³ Cf. E.G. Turner, *The Typology of the Early Codex*, pp. 67-68.

⁴⁴ However, also in *P. Bodm. II* (P66) (cf. *supra*, p. 12) quires of 4 sheets and quires of 5 or even more sheets have been mixed up. Cf. E.G. Turner, *The Typology of the Early Codex*, p. 62 and p. 70. For other papyrus codices showing unequal quires, see the list of Turner, *o.c.*, p. 62 (Table 9: List of 'Quaterniones,' nos. 5 and 8).

⁴⁵ S. Jennet, *The Making of Books*, Glasgow-London, 1964², pp. 155-156, pointed to the difficulty involved in rewinding a papyrus roll when the last column was reached or when any other column than that being read was referred to. He considered this difficulty as the reason for the invention of the codex form, which he imagines as follows: 'It occurred to some inventive intelligence that if the paged scroll was folded in concertina fashion, instead of being wound on a roller, it would be more accessible; and perhaps the same person thought of fastening the back folds together, to give the contraption better mechanical unity. This form of book was much used throughout the East and is known as *orihon*. There was some waste of material, since

only one side could be written on, the other being hidden inside the folds; but once the spine was securely fastened, the foredge could be cut, and both sides of the leaf utilized.'

E.G. Turner, *Greek Papyri*, Oxford, 1968, p. 173, n. 32, already commented that 'The suggestion (...) is not supported by any known examples from the ancient world.' I want to add two remarks myself: (1) The difficulty in handling a papyrus roll has been greatly exaggerated by S. Jennet, as becomes clear from T.C. Skeat, 'Two Notes on Papyrus,' in: *Scritti in Onore di Orsolina Montevicchi*, Bologna, 1981, pp. 373-378; see pp. 373-376: *Was re-rolling a papyrus roll an irksome and time-consuming task?* T.C. Skeat for that matter concluded: 'The necessity for re-rolling is unlikely to have been an important factor in the long drawn-out battle between the roll and the codex' (p. 376). See now also T.C. Skeat, 'Roll versus Codex - A New Approach?,' in: *Zeitschrift für Papyrologie und Epigraphik*, 84 (1990), pp. 297-298. (2) The concertina model in *Ac. 1499* is in my opinion certainly *not* the example missed by E.G. Turner. What we would need to support Jennet's theory is a *written* roll clearly folded in concertina fashion.

⁴⁶ *The Facsimile Edition of the Nag Hammadi Codices. Introduction*, p. 60: Table of Length of Rolls.

⁴⁷ Cf. E.G. Turner, *The Typology of the Early Codex*, p. 56.

⁴⁸ H. Ibscher, 'Beschreibung der Handschrift,' included in: A. Boehlig, *Der achmimische Proverbientext nach Ms. Berol. orient. oct. 987*, part I: *Text und Rekonstruktion der sahidischen Vorlage* (*Studien zur Erforschung des christlichen Aegyptens*, 3), München, 1958, pp. XXI-XXVII.

⁴⁹ *The Terms Recto and Verso. The Anatomy of the Papyrus Roll*, p. 61.

⁵⁰ See for example the 3rd-century Menander codex *P. Bodm. IV*, *P. Bodm. XXV*, *P. Bodm. XXVI*, *P. Col. Inv. 904* + *P. Barc. Inv. 45*. Cf. also J.M. Robinson, *The Future of Papyrus Codicology*, p. 37.

⁵¹ *The Typology of the Early Codex*, p. 74.

⁵² *The Codex*, p. 198.

⁵³ See *supra*, note 30.

⁵⁴ *The Typology of the Early Codex*, p. 73.

⁵⁵ *Coptic Documentary Papyri from the Beinecke Library (Yale University)* (*Publications de la Société d'Archéologie Copte, Textes et Documents XVII*), Cairo, 1986, p. 8 and n. 21.

⁵⁶ Edited by J.R. Rea and P.J. Sijpesteijn, *Corpus Papyrorum Raineri V: Griechische Texte*, II, Wien, 1976, pp. 71-132. See also R.S. Bagnall and P.J. Sijpesteijn, 'Currency in the Fourth Century and the date of CPR V 26,' in: *Zeitschrift für Papyrologie und Epigraphik*, 24 (1977), pp. 111-124, who propose as a date: 388 A.D. On this date however, see also J. Gascou, 'Les codices documentaires Égyptiens,' in: *Les débuts du codex*, p. 85 ('deuxième moitié du Ve s. au plus tôt').

⁵⁷ See *supra*, p. 9. His paper has been published now in *Les débuts du codex*, pp. 71-101.

⁵⁸ *Les codices documentaires Égyptiens*, p. 82.