



Library Damage Atlas

A tool for assessing damage

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The *Library Damage Atlas* is an initiative of the Flanders Heritage Library (Vlaamse Erfgoedbibliotheek) in collaboration with the Netherlands' Bureau Metamorfoze. This English edition is the fifth publication in the series *Armarium. Publicaties voor erfgoedbibliotheeken* (*Publications for Heritage Libraries*) and complements the previously published *Archives Damage Atlas*.

The Flanders Heritage Library is a network established by six heritage libraries. Through projects and research, it develops and disseminates expertise concerning the preservation, cataloguing and digitisation of the heritage collections held by libraries in Flanders and Brussels (Belgium). The network organisation receives support from the Flemish government for this work.

Metamorfoze is the National Programme for the Preservation of Paper Heritage in the Netherlands and is accommodated within the Koninklijke Bibliotheek, National Library of the Netherlands. It is an initiative by the Netherlands' Ministry of Education, Culture and Science. The purpose of the programme is to engage in the struggle against acidification and other forms of intrinsic decay, such as ink corrosion and copper corrosion.



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Author

Marijn de Valk

Editors

Sam Capiau

Erik van der Doe

Hilde Schalkx

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A

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INTRODUCTION

Heritage libraries conserve fascinating sources. They make it possible for anyone to gather knowledge about our past, or to enjoy the experience of reliving a bygone age. It is a real challenge to preserve these ancient texts and historic documents for future generations because these irreplaceable heirlooms are vulnerable. Without care even recent publications will not remain in good condition and will therefore be unable to be consulted.

Ongoing accessibility to our collective memory is assured by a well thought out conservation policy. But in order to take appropriate measures a good understanding of the issues is needed. As a Flemish network organisation, the Flanders Heritage Library (Vlaamse Erfgoedbibliotheek) provides managers of heritage libraries with a tool for this: the Universal Procedure for Library Assessment. This is a statistical model for damage registration, which is both practical and efficient. UPLA has been based on the Universal Procedure for Archive Assessment drawn up by

the Netherlands' National Archives (Nationaal Archief van Nederland).

The *Library Damage Atlas* is a significant aid for anyone who is involved in UPLA. It gives a description of all forms of damage relevant to developing a conservation and management plan. It can be used independently to acquire an understanding of the kinds of damage occurring in a library collection. The atlas and UPLA have been compiled so that they can be used without specialist conservation expertise. With its broad user-friendly accessibility we aim to disseminate knowledge concerning damage to library materials and, in addition, create an awareness of collection care. Without doubt, prevention is better than cure.

The atlas is the English translation of the *Schadeatlas Bibliotheken*, published in 2014 by the Flanders Heritage Library in collaboration with the Bureau Metamorfoze, which had previously (2007 and 2017) already published a *Schadeatlas Archieven*.

In the English translation (*Archives Damage Atlas*), which was published in 2010, tropical types of damage were also included.

Metamorfoze is the Netherlands' National Programme for the Preservation of Paper Heritage and is housed at the Koninklijke Bibliotheek, the National Library of the Netherlands. This programme, which is an initiative of the Ministry of Education, Culture and Science, provides financial support to heritage institutions in their measures to combat intrinsic decay through conservation and digitisation. Additionally, Metamorfoze supports research into paper conservation.

This publication by the Flanders Heritage Library and Metamorfoze is a fine example of international collaboration. We not only exchange expertise and tools between Flanders and the Netherlands, but also by means of this English version we put this wealth of information at the disposal of the international community. In doing so we aid heritage

libraries throughout the world to continue to provide the cornerstones for enjoyment, insight and innovation – now and in the future.

Eva Wuyts
Coordinator at the Flanders Heritage Library
Marg van der Burgh
Programme Manager at Metamorfoze

UNIVERSAL PROCEDURE FOR LIBRARY ASSESSMENT

The *Library Damage Atlas* is a tool used in undertaking a damage assessment of library collections according to the *Universal Procedure for Library Assessment* (UPLA), a statistical model developed in 2013 by the Flanders Heritage Library (Vlaamse Erfgoedbibliotheek). UPLA is based on the *Universal Procedure for Archive Assessment* (UPAA), designed in 1990 by the Dutch National Archives (Nederlandse Rijksarchiefdienst) together with TNO-Delft.

UPLA provides insight into the state and accessibility of library materials for consultation, based on random sampling. The two basic principles are the extent of the types of damage indicated and the degree to which there is a risk of material loss or new or further damage when books are consulted.

Included within UPLA and in this damage atlas are the most important types of damage which can trigger conservation measures. As a result, an UPLA study is ideal for the development or underpinning of a conservation and management plan for a library collection.

The study results clearly reveal the areas where conservation is needed. At a policy level they give insight into the amount of conservation work required. In addition, the UPLA study makes it possible to chart the damage by repeating the survey after a few years. In this way, the accelerated intrinsic decay within the collection can be measured.

UPLA is suitable both for entire libraries as well as for partial collections. Photos, charters, maps and modern information media (cd's, tapes, etc.) are excluded from UPLA. Newspapers and loose (archival) materials are, in contrast, included in the study. Whilst in principle only catalogued items are included in the study, the model can also be applied to collections which are not yet catalogued.

Further information concerning UPLA can be found on www.upla-model.be.

USING THE DAMAGE ATLAS

A book is an information medium with material characteristics. Damage can occur for a variety of reasons. Twenty-two types of damage profiles are described in this atlas, divided into four groups:

- A Damage to the book cover: the outside of a book
- B Damage to the book construction: a book's opening and closing mechanism
- C Damage to the book block: the actual information medium, on parchment or paper
- D Biological damage: mould and pest damage

In assessing the damage we scrutinize the book, starting on the outside and progressing to the inside. Firstly, we examine the book cover. Then we open the book to see whether all the essential components are still attached and functioning correctly: the construction. A book is, after all, inherently a moving object. It has to be able to be opened and then closed. This makes certain demands on the construction. Furthermore, a book has to fit well into and be firmly attached to the binding. This

is also part of the construction and carefully assessed. Next, we assess the damage on the inside: the book block. Biological types of damage can, of course, occur everywhere: on the book cover, on the component parts of the construction or on the book block. They are the result of poor storage conditions.

For each of the twenty-two damage categories the assessment is always carried out in exactly the same way, in three steps.

TYPE OF DAMAGE

The first step is to determine the type of damage. This atlas explains how each kind of damage can be recognized, what the possible causes are and what the consequences might be for the book as a whole. References indicate the relationship with other types of damage. Detecting a single visual characteristic is sufficient to specify a type of damage. Thus, not all characteristics need to be applicable simultaneously.

EXTENT OF DAMAGE

In the second step we look at the extent of the damage and determine whether it is moderate or serious. With each type of damage it is precisely defined what is considered moderate and what serious. Photos help illustrate the difference.

ACCESSIBILITY

Once damage has been determined and its seriousness established, it can be judged whether the book is still able to be consulted. Is it probable that new or further damage will be caused by normal use? In that case the book can no longer be consulted, irrespective of whether the damage already present is moderate or serious.

A

DAMAGE TO THE BOOK COVER

A book cover preserves and protects the book block and, in addition, has an aesthetic function. The book cover is also sometimes called the word's jacket. The types of damage in this chapter relate to this jacket, the outside; they are visible before the book is opened.

A 1 DUST AND SURFACE DIRT

Dust and dirt on the book cover and on the book block's edges are an indication of the quality of the storage conditions and regular maintenance in a library. In addition these deficiencies are the breeding grounds for biological damage by mould and pests.

A 2 POOR CONDITION OF THE COVERING MATERIAL

The material used on the cover determines in principle the external appearance of the book: sober or, alternatively, lavishly decorated. But it also has a functional task. Together with the other constructional materials in the bookbinding, it forms the link between the spine and the covers. This applies equally to all types of covering material, whether it is paper, linen, parchment, leather or a different material.

A 3 RED ROT

Red rot is a type of damage related to the condition of the covering material. This type of damage is dealt with separately because it is a very common kind of deterioration. Moreover, it has an impact on the surroundings due to the release of leather dust.

A 4 HARMFUL TAPES AND REPAIRS

Damaging adhesive tape and old repairs can be the cause of serious harm to a book cover. Softeners in the adhesive layer attack the covering material or can become sticky. Poorly executed repairs can initiate new damage to the book construction.

A 5 LOOSE PARTS

Weak covering can tear and become loose. Often this occurs first on the hinge points of the book, where the covering material is under the greatest stress. But also the head and tail edges of the spine are vulnerable, as are the board edges.

A 6 MISSING PARTS

Each book component has a function. Parts which are entirely or partially missing render a book vulnerable and increase the chance of damage if it is consulted. In the most extreme case, the entire book cover is absent.

A 7 DAMAGED BOARDS

Boards give the book strength. Damaged boards no longer provide support to the covering material. If parts are missing, they provide inferior support to the book block.

A 8 DAMAGED FASTENINGS AND FURNITURE

Fastenings retain the book block in a securely closed position. This keeps the pages flat and is particularly important when the book blocks are parchment. Damaged or missing fastenings no longer fulfil this purpose and protruding parts of the fastenings and furniture can cause damage to other books.



Dust on the outside of the book cover and on the book block's edges usually indicates poor storage conditions or insufficient cleaning in a library. Insects, pests or birds can cause contamination in the form of residue produced by gnawing or boring insects, secretion products or body remnants.

Dust and dirt can be loose and easy to remove. But contamination can also attach itself to the materials of the book cover. Dust can hold moisture and thus form a suitable microclimate for moulds. Dust spreads when handling books, and is thereby deposited on clean pages.

CAUSES

- Poor storage conditions
- Insufficient cleaning routine
- Incidents, such as building renovation work
- Mould attack
- Pest damage

SEE ALSO

- [C12](#) Dust and surface dirt on the book block
- [D21](#) Mould damage
- [D22](#) Pest damage

MODERATE

- Loose dust or surface debris on the edges of the book block or the book cover
- Dust or surface dirt that transfers to the hands, a book pillow or the environment
- Dust or surface dirt that is easy to remove



1.1

Book covers with loose dust on the cover and the top edge

SERIOUS

- Dust or surface contamination attached to edges, to the book block's edges or to the binding.
- Dust or loose surface dirt that can fall into the book block
- Dust or surface dirt that transfers to the hands, a book pillow or the environment
- Dust or surface dirt that cannot easily be removed



1.2

Seriously contaminated book due to a catastrophe and mould growth

NO ISSUES WITH HANDLING

- Dust and surface dirt do not hamper opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



1.3

Half-binding in linen where the textile mainly holds the dust



SERIOUS



1.4

Penetration of dirt on the top edges



HANDLING WILL WORSEN THE DAMAGE

- Dust or surface dirt hamper the opening and closing of the book.
- Due to the caked dirt or loose dirt that easily gets scattered, the book cannot be consulted without risk of material loss or new damage.

MODERATE



1.5

Loose dust on the top edges, which can fall into the books when opened



SERIOUS



1.6

Paper bindings that are contaminated by deeply penetrated dust





The covering material of a book is more susceptible to ageing due to environmental factors than the unexposed inside; such as the influence of light, air, air pollution and fluctuations in temperature and humidity.

As a result of these factors leather can show hairline cracks and ruptures. The upper layer (the grain) can become loose and peel off.

Parchment is extra sensitive to changes in temperature and humidity. When subjected to high temperatures, irreversible hardening and distortion occur. In combination with acids, parchment can become grey and brittle. Gelatinization is another form of parchment degradation; it shrinks, loses its structure and breaks into fragments.

Internal chemical processes affect the condition of the covering material which stem from the method of manufacturing the item.

- Paper and linen can contain acids, making them fragile.
- Leather is acidic and may be further acidified by the use of certain tannins in its fabrication and the presence of metals.
- From the nineteenth century onwards, during

the preparation of skins to produce parchment, certain materials were added to accelerate the production process. These accelerators made the covering material stiffer and less durable.

Leather in particular is harmed by techniques used for its decoration; marbling or splashing (with small drops of a liquid) of leather covers was a technique often used by bookbinders. The acidic or basic substances used in this technique can degrade the leather and are visible as embedded dots or other decorative patterns thus mimicking marble.

All these processes are more visible in places where the covering is under mechanical duress; especially at the hinges, but the covering material is also vulnerable along the edges and on the corners of the book.

In addition, damage is also caused by injudicious handling. This involves mechanical surface damage such as scratches, abrasions and indentations. Metal fastenings and furniture can cause damage to neighbouring books, especially when sharp parts or small nails protrude. This occurs in all types of covering, whether made of paper, linen or leather.

CAUSES

- Climatic conditions
- Air pollution
- Aerial oxidation
- Light
- Production methods
- Decoration techniques
- Injudicious handling

SEE

- Spots and discolouration (generally not harmful): [A1](#) Dust and surface dirt on the book cover
- Torn covering material and torn outer hinges: [A5](#) Loose parts on the book cover

SEE ALSO

- [A3](#) Red rot

MODERATE

- Local surface damage to leather, parchment, linen or paper: hair cracks and splits in the surface grain, scratches, flaking, grayed and brittle parchment, damaged (blind) embossing and title emblems, leather with chemical damage due to acidic or basic marbling
- With paper covers: local acidification of the wrapper



2.1

Discoloured book spine with local mechanical surface damage

SERIOUS

- Damage to the entire surface of leather, parchment, linen or paper: hair cracks and splits in the surface grain, scratches, flaking, greyed and brittle parchment, damaged (blind) embossing and title emblems, leather with chemical damage due to acidic or basic marbling
- With paper covers: general acidification of the wrapper



2.2

Leather cover with severe mechanical and chemical damage

NO ISSUES WITH HANDLING

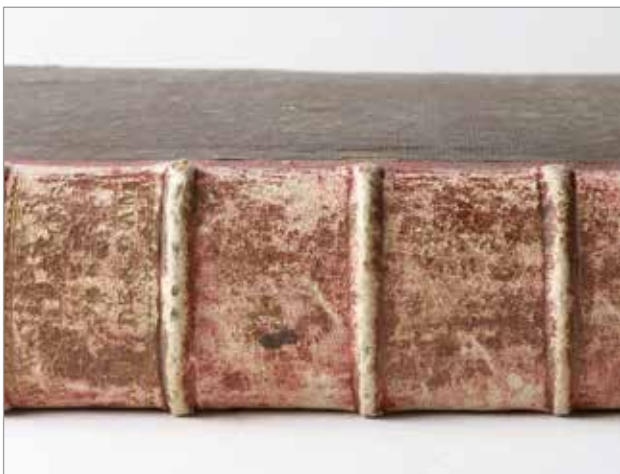
- The poor condition of the covering material does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



2.3

Spine covering made with red-coloured alum tawed skin, slightly damaged and worn



SERIOUS



2.4

Leather covering with severe mechanical damage over the entire surface



HANDLING WILL WORSEN THE DAMAGE

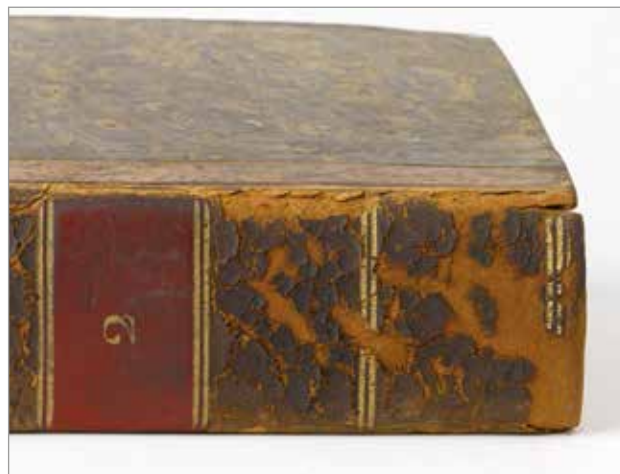
- The poor condition of the covering hampers opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



2.5

Leather with partially released surface layer



SERIOUS



2.6

Spines where the parchment is embrittled



NO ISSUES WITH HANDLING

NO ISSUES WITH HANDLING

MODERATE



2.7

Leather covering that is locally
sprinkled with acid for decoration



MODERATE



2.8

Worn paper spine



NO ISSUES WITH HANDLING

HANDLING WILL WORSEN
THE DAMAGE

MODERATE



2.9

Worn linen spine



MODERATE



2.10

Spine covered with parchment
which has become gelatinized





Red rot is a form of damage to leather covers often associated with red discolouration. However, the colour may vary from yellow to brown and red-brown. A leather book cover with red rot degrades and loses its internal structure.

The decay takes place in different stages. Firstly fibres detach from the surface. Then the leather also loses its internal flexibility. Finally it turns to powder.

Red rot is caused by chemical degradation. Leather from the second half of the nineteenth century shows more red rot than leather from the period before. This was due to the tanning materials used in production at that time.

External chemical factors also play a role. Air pollution, originally produced by open fires and now coming from industry and vehicles, has a deleterious effect on the condition of leather. Furthermore heat and light heighten degradation via accelerated oxidation.

CAUSES

- Production methods
- Fluctuating climatic conditions
- Air pollution
- Aerial oxidation
- Light

SEE

- Stains and discolouration (generally not harmful): [A1](#) Dust and surface dirt on the book cover
- Torn covering material and torn outer hinges: [A5](#) Loose parts on the book cove

SEE ALSO

- [A2](#) Poor condition of the covering material

MODERATE

- Localized damage to the leather surface
- Initial fracturing of the surface grain
- Powdering on the spine or along the edges
- Reddening or lightening of brown colour on the spine or along the edges



3.1

Leather cover with localized loose surface grain due to red rot

SERIOUS

- Powdering of large parts of the cover or even of the entire leather surface
- The colour changes from brown to red or becomes lighter for large parts of the cover or the entire leather surface



3.2

Leather covering that has become completely discoloured and powdery through red rot

NO ISSUES WITH HANDLING

- Leather powder does not transfer to the hands and the surrounding area does not become dirty.
- The leather does not tear.
- The poor condition of the covering does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



3.3

Leather cover with localized loose surface grain due to red rot

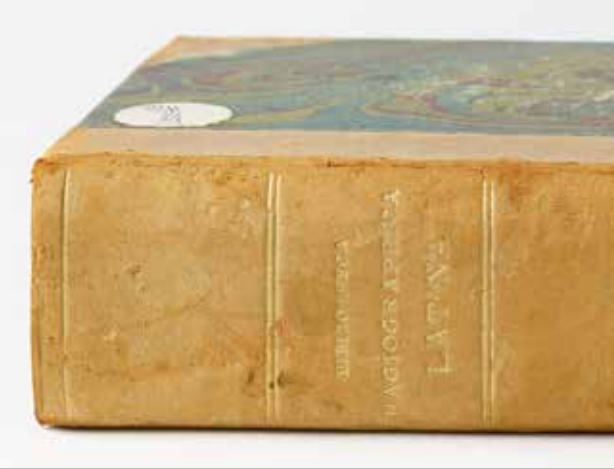


SERIOUS



3.4

Head of a leather cover completely affected by red rot



HANDLING WILL WORSEN THE DAMAGE

- Leather powder transfers to the hands and the surrounding area becomes dirty.
- The leather tears.
- The poor condition of the covering hampers the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



3.5

Material loss and tearing of a leather cover that has suffered local deterioration by red rot

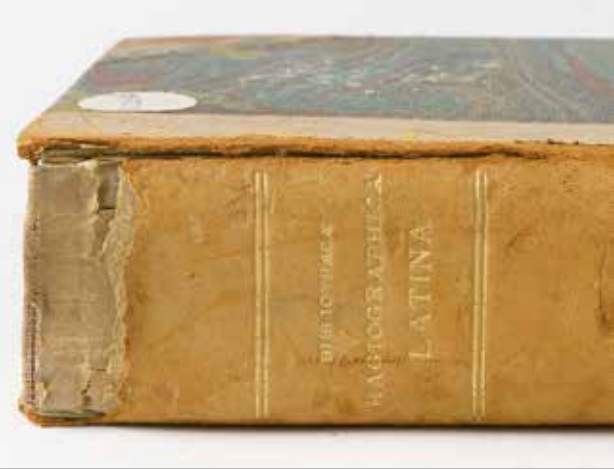


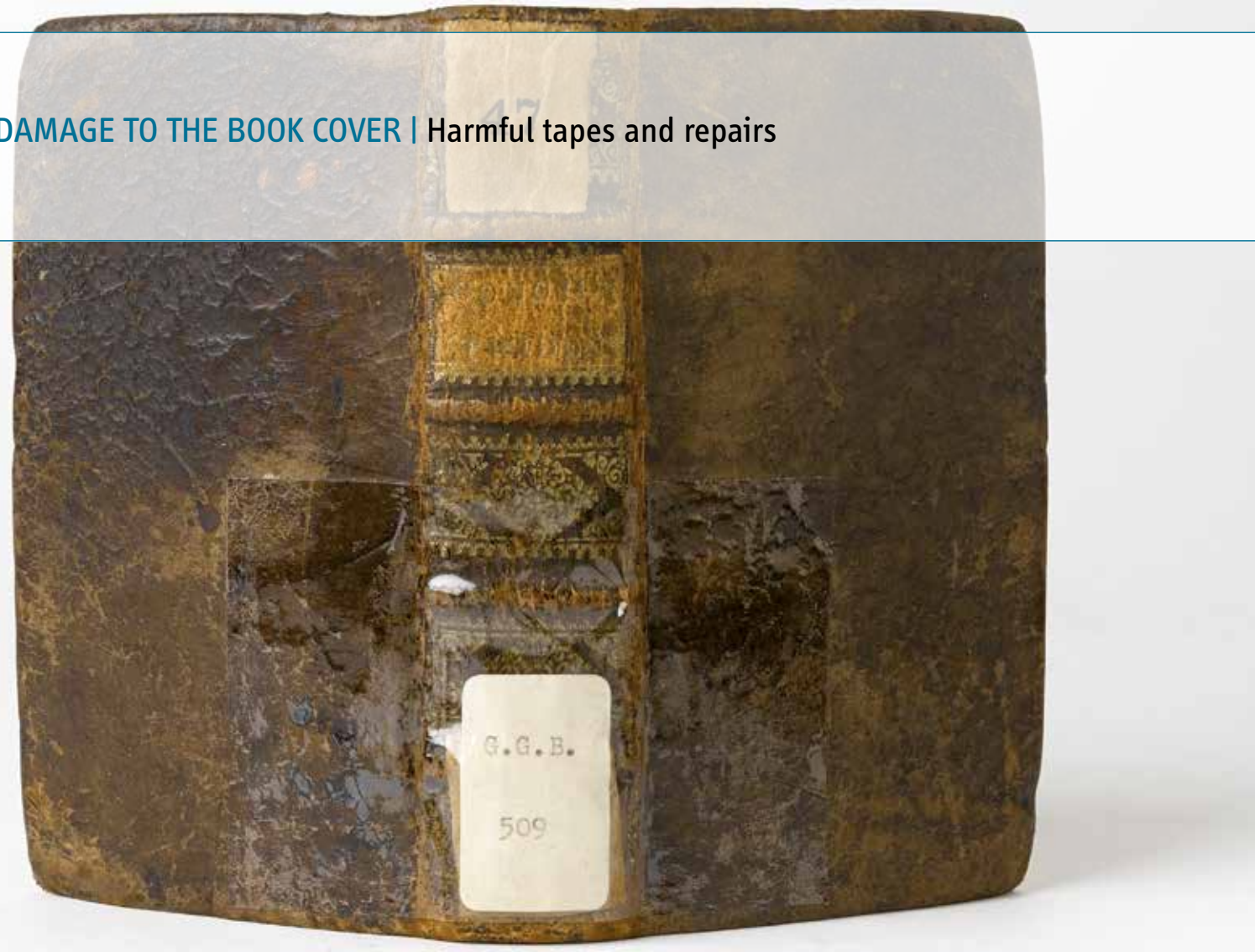
SERIOUS



3.6

Material loss and torn leather cover that has become completely damaged by red rot





Tapes and old repairs to the book cover are harmful if they react with the material underneath . Adhesive tapes and labels consist of a synthetic carrier and an adhesive layer. Both can contain softeners.

The adhesive becomes sticky, and migrates into the book covering, causing discolouration and hardening. The colour often changes from colourless to light yellow to dark brown. Eventually the adhesive layer strips away from the carrier. Other glues (especially animal-based glue) can also migrate into the book cover and cause damage by hardening and brown discolouration .

The tape carrier can be a source of damage if it is made of an acidic material, such as some elastomeric tapes. That causes local acidification of the book cover.

It also happens that repairs can be too thick or do not have the correct flexibility. This creates tension in the original material of the book cover.

Prudent repairs are reversible and they can be removed without damage. The aesthetic aspect of a repair is actually of secondary importance. Some repairs are unattractive, for example because the colour or material is very different from the surface, but that is not harmful to the book cover.

CAUSES

- Repairs with material not suitable for conservation, for example adhesive tape and acidic paper
- Repairs of an inappropriate thickness and/ or the application technique when compared to the nature of the damage or the original material

SEE

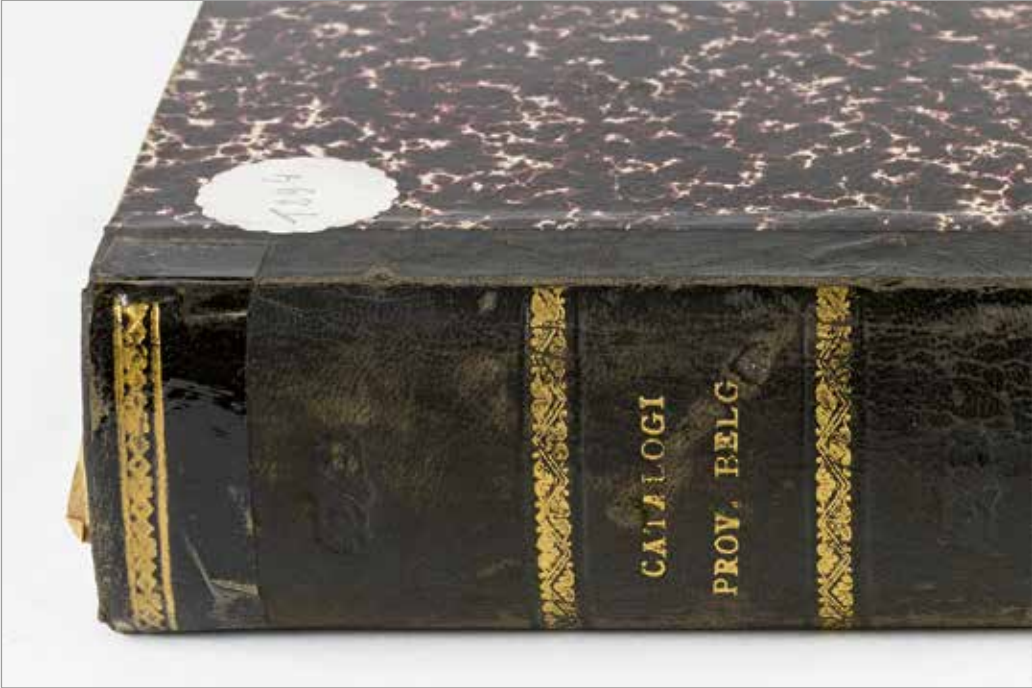
- Repairs to the inner hinge: **C13** Harmful tapes and repairs to the book block

SEE ALSO

- **C13** Harmful tapes and repairs to the book block

MODERATE

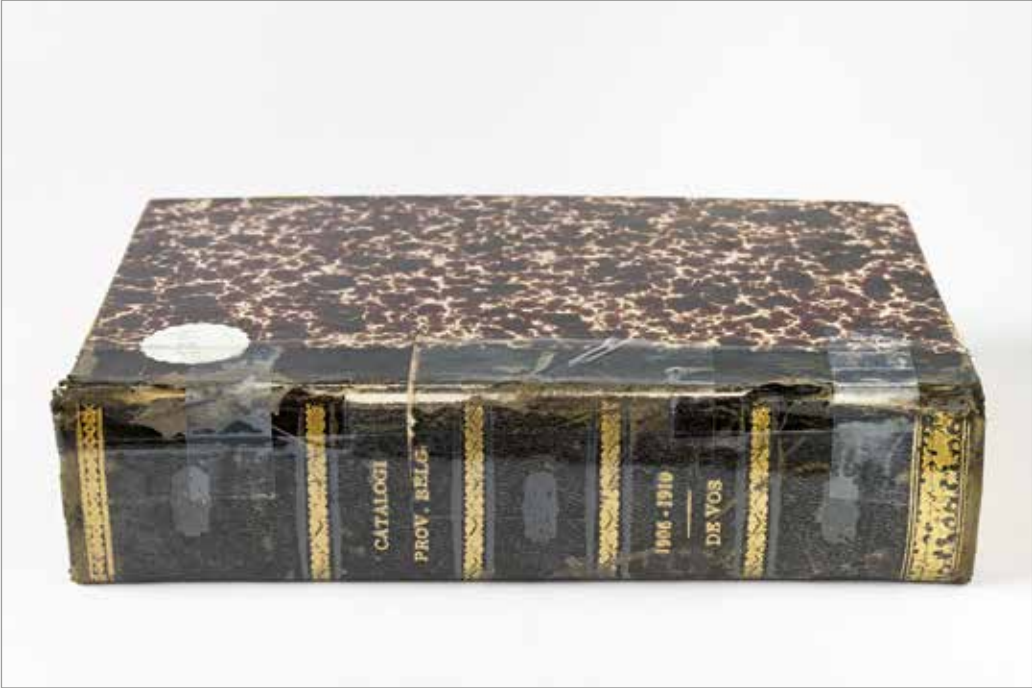
- Harmful repair tapes or repairs to the book cover with a total area of less than 25 cm² (e.g. 5 x 5 cm)



4.1
Leather cover repaired at the head with one piece of adhesive tape

SERIOUS

- Harmful repair tapes or repairs to the book cover with a total area of more than 25 cm² (e.g. 5 x 5 cm)



4.2
Harmful repair tapes or repairs to the book cover with a total area of more than 25 cm² (e.g. 5 x 5 cm)

NO ISSUES WITH HANDLING

- Harmful repair tapes and the repairs do not stick to other parts of the book or to other books.
- Harmful repair tapes and the repairs do not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



4.3

Paper cover that has been repaired
with adhesive tape



SERIOUS



4.4

Paper covers that have been
repaired with large pieces of
adhesive tape

HANDLING WILL WORSEN
THE DAMAGE

- Harmful tapes or repairs stick to other parts of the book or to other books.
- Harmful tapes or repairs hamper the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



4.5

Repair with a modern adhesive that
hampers the opening of the book



SERIOUS



4.6

Linen book cover with loose spine
covering repaired with various types
of adhesive tape





If the covering material of the book is weakened, it can easily tear. But even covering material in good condition may also be damaged by injudicious handling during storage, transport or consultation. This damage can occur in all types of covering material: paper, linen, leather, parchment or other materials.

Damage often occurs first at the hinges or at the top of the spine (the endcap). Torn and loosened parts are very vulnerable to further damage since they may easily become snagged during use. Detached parts of a book can easily be mislaid; the damage is then serious.

CAUSES

- (Injudicious) handling
- Incorrect storage

SEE

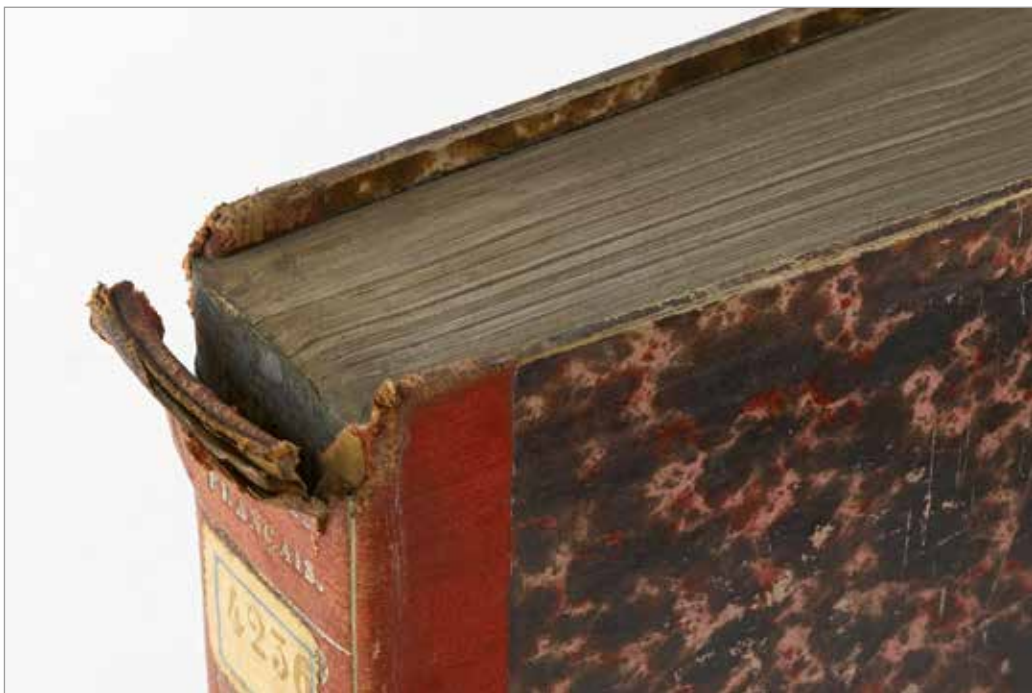
- Loose fastenings: [A8](#) Damaged fastenings and furniture
- Loose end leaves, waste sheets and spine linings: [B10](#) Damaged bands and adhesion to covers
- Loose covers: [B10](#) Damaged bands and adhesion to covers
- Loose leaves or gatherings: [B11](#) Adhesion of leaves and gatherings

SEE ALSO

- [A2](#) Poor condition of the covering material

MODERATE

- Partially loose parts of the covering material
- Partially loose turn-in
- Covering material of one hinge torn
- Loose endcap on head or tail side
- Partially loose parts (e.g. end band or title emblem)



5.1

Leather spine with loose endcap

SERIOUS

- Completely loose parts of the covering material
- Completely loose turn-in
- Covering material torn on both hinges
- Completely loose spine
- Completely loose parts (for example, end band or title emblem)



5.2

Linen cover where spine is completely loose

NO ISSUES WITH HANDLING

- Loose parts do not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage. Loose parts will not become any further detached.

MODERATE



5.3

Paper covers where the spine covering is partially loose



SERIOUS



5.4

Parchment cover where the turn-in of the covering material is loose (in addition, the pastedown is loose)



HANDLING WILL WORSEN THE DAMAGE

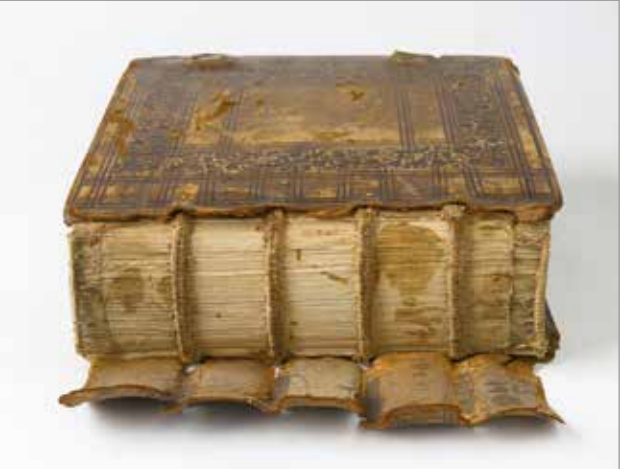
- Loose parts hamper the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage. Loose parts can loosen further.

MODERATE



5.5

Leather book cover with loose spine still attached to one hinge



SERIOUS



5.6

Loose linen spine cover (in addition, the covers are loose and there is damage due to adhesive tape)



NO ISSUES WITH HANDLING

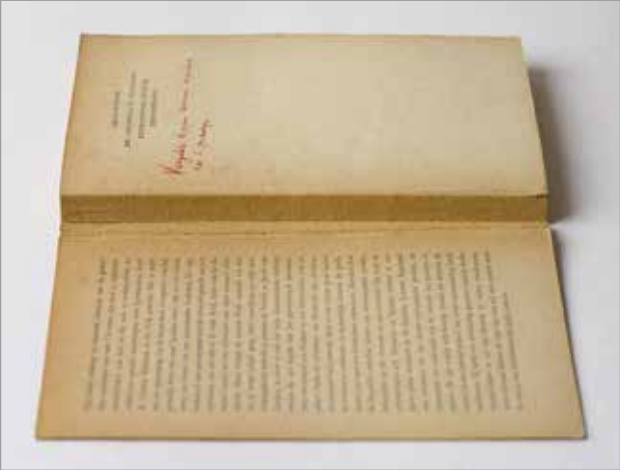
HANDLING WILL WORSEN
THE DAMAGE

MODERATE



5.7

Paperback in which the spine is
loose from the lumbecked book
block



MODERATE



5.8

Torn paper wrapper



HANDLING WILL WORSEN
THE DAMAGE

HANDLING WILL WORSEN
THE DAMAGE

MODERATE



5.9

Parchment book cover with partially
loose turn-in



MODERATE



5.10

Tears in the linen and parchment
spine covering





Each component of a book cover has a function. Parts that are completely or partially missing make a book vulnerable. They increase the chance of new or further damage when the book is consulted. This may include the entire spine, the spine inlay, the covering material of the covers, the wrapper, complete covers, end leaves, spine linings and the end bands. In the most extreme case, the whole book cover has disappeared and the book block is unprotected.

Not all parts are necessarily originally present with each book. Therefore, it sometimes requires investigation to determine whether parts have disappeared or may have never been present in the first place.

CAUSES

- Injudicious handling
- Incorrect storage
- Mould attack
- Pest damage

SEE

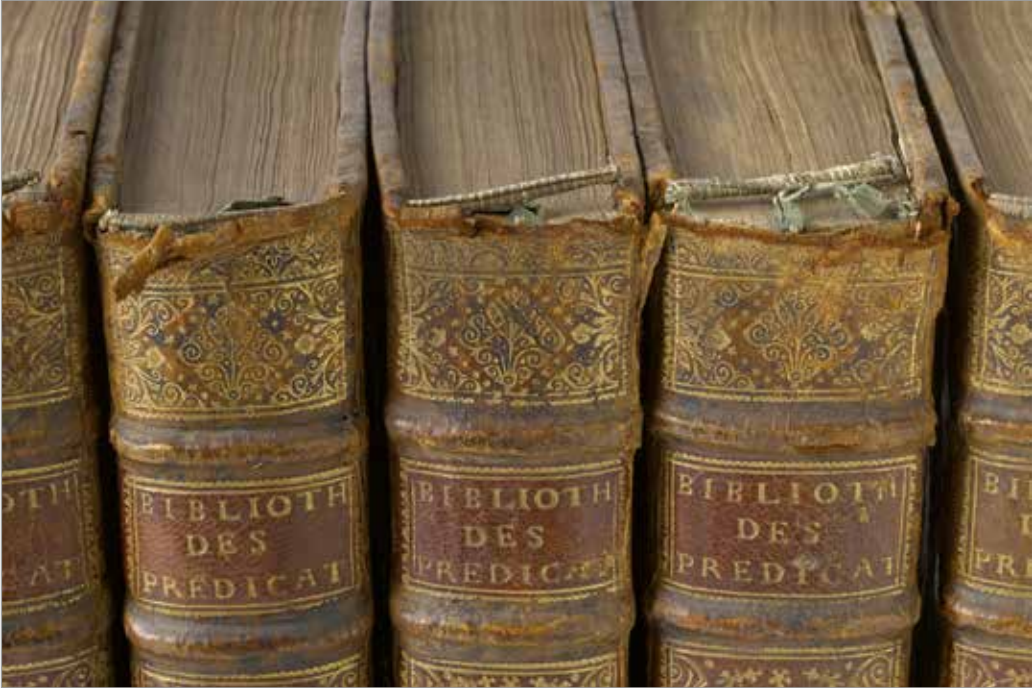
- Missing boards [A7](#) Damaged boards
- Missing fastenings: [A8](#) Damaged fastenings and furniture
- Missing bands: [B10](#) Damaged bands and adhesion to covers

SEE ALSO

- [D21](#) Mould damage
- [D22](#) Pest damage

MODERATE

- Partially missing covering material (e.g. endcaps or part of the spine, covering of the corners, part of the wrapper)
- Partially missing parts (e.g. end bands or covers)



6.1
Leather covers with missing pieces of covering material on the top of the spine

SERIOUS

- Covering material completely absent (e.g. spine, spine inlay, covering material of the front or back of the covers, complete wrapper)
- Completely missing parts (e.g. end bands, spine inlay, covers, entire book cover)



6.2
Leather cover without any covering on the spine

NO ISSUES WITH HANDLING

- The book block is protected: it is covered and does not protrude.
- The missing part does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



6.3

Cover with small parts of the parchment covering missing



SERIOUS



6.4

A linen and a leather cover without a spine



HANDLING WILL WORSEN THE DAMAGE

- The book block is unprotected: it is no longer completely covered or protrudes.
- The missing part hampers the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



6.5

Paper book cover with lacunae along the edges of the front cover



SERIOUS



6.6

Book block without cover





The boards support the book block and have an important protective function. Boards are usually wood or cardboard, although generally not visible when they are covered. Flexible covers do not have boards.

When the boards are made of cardboard the corners and edges are likely to be the first to be abraded, making them soft and fluffy. The thickness, the raw material and the adhesive technique used determine the durability of the cardboard. Wooden boards can break. If parts are weak or missing, damage to the covering material and book block will occur quickly.

CAUSES

- Injudicious handling
- Incorrect storage
- Mould attack
- Pest damage

SEE

- Damaged covering material: [A2](#) Poor condition of the covering material, [A3](#) Red rot
- Loose turn-in: [A5](#) Loose parts of the book cover
- Missing covers: [A6](#) Missing parts of the book cover
- Warped board: [B9](#) Warping of book cover and book block
- Boards of acidic material: [C17](#) Acidification of the end leaves

SEE ALSO

- [D21](#) Mould damage
- [D22](#) Pest damage

MODERATE

- Indentations or tears in one or both boards
- Locally softened board edges, boards or corners
- Partially split boards



7.1

Book covers with damaged cardboard corners

SERIOUS

- Completely softened board edges or boards
- Completely split boards
- Broken boards
- Incomplete or missing boards



7.2

Cover with cardboard boards with a missing corner; the remainder is weak

NO ISSUES WITH HANDLING

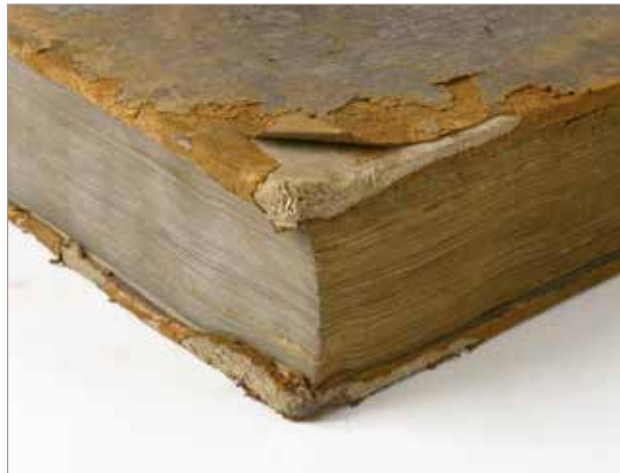
- The book block is protected: it remains covered and does not protrude.
- The damaged boards do not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



7.3

Soft cardboard corner that is no longer covered



SERIOUS



7.4

Cardboard boards which have become completely soft and frayed



HANDLING WILL WORSEN THE DAMAGE

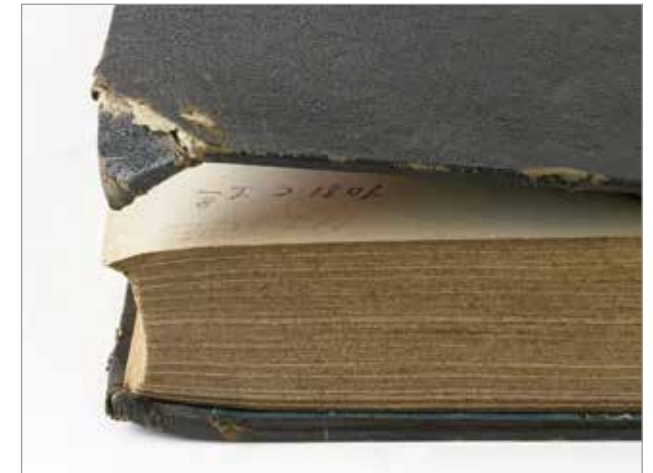
- The book block is unprotected: It is no longer completely covered or it protrudes.
- The damaged boards hamper the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



7.5

Damaged cardboard corner



SERIOUS



7.6

Damaged wooden board





Fastenings is the collective name for all kinds of secure closures made from diverse types of material. Under furniture we understand bosses, corner and centre pieces, elongated fittings along the edges of the cover, chains and other elements which are attached to the book cover.

The purpose of these fastenings is to keep the book block shut. This provides greater protection against dust, dirt and pests. In a properly closed book variations in humidity and temperature have less influence on expansion and shrinkage of the book block, or on warping of the book cover. Paper – and especially parchment – remain flatter in a book with fastenings.

Metal fastenings are sensitive to corrosion and oxidation. Leather or textile long strap fastenings can break during handling and storage.

CAUSES

- Injudicious handling
- Incorrect storage

MODERATE

- Damaged or broken fastenings or furniture (not loose)
- Weak adhesion of fastenings or furniture
- Ill-fitting fastenings or furniture
- Corroded metal fastenings or furniture
- Loose, protruding parts (e.g. small nails) from metal fastenings or furniture



8.1

Metal fastening which no longer closes because the book block is warped

SERIOUS

- Loose fastenings or furniture
- Missing fastenings or furniture
- Open book block resulting from missing fastenings



8.2

A missing clasp

NO ISSUES WITH HANDLING

- Damaged fastenings or furniture do not hinder the opening or closing of the book.
- The book can be consulted without the risk of material loss or new or further damage.

MODERATE



8.3

Broken fastening strap of alum
tawed leather



SERIOUS



8.4

Parchment notebook with a flap
where the fastening strap is missing



HANDLING WILL WORSEN THE DAMAGE

- The fastenings or furniture hinder the opening and closing of the book.
- The book cannot be consulted without the risk of material loss or new damage.

MODERATE



8.5

Photo album with loose fastening



SERIOUS



8.6

Book with a loose clasp which is
still present



B

DAMAGE TO THE BOOK CONSTRUCTION

The contents of a book are preserved and protected by the cover. A book cover which functions well can be opened and closed, just like a box that provides good protection to its contents. A book which is consulted is a manipulated object.

The three types of damage in this chapter are related to holding the contents together. The movement of opening, consulting and then closing the book again, occurs principally in the spine and in the hinge/joint points.

B 9 WARPING OF BOOK COVER AND BOOK BLOCK

If the book cover or book block has lost its original shape, then sometimes the hinges are also no longer straight. The movement of forcing the opening and closing then causes damage.

B 10 DAMAGED BANDS AND ADHESION TO COVERS

The bands are the backbone of many kinds of book covers. They form the base on which the gatherings are sewn. In judging the condition of a book a careful inspection of the state of the bands is essential. They often form an important connection between the book block and the covers. We can make a comparison with the human joint. The gathering and covers are the bones of a book. Damage to the bands and their adhesion to the covers is the equivalent of damaged muscles. In addition, the covering material (the skin of the book) for that matter often contributes to the connection between the book block and the covers.

B 11 ADHESION OF LEAVES AND GATHERINGS

Under this heading fall damage to the sewing or the glueing. Leaves or gathering can become loose due to broken sewing threads or a badly glued spine.

B9 DAMAGE TO THE BOOK CONSTRUCTION | Warping of book cover and book block



A book is warped when it no longer lies flat on the table. Or more seriously: when it can no longer stand upright alongside other books on the shelf. If a substantial number of leaves in the book block have become folded or warped, it is possible that the book cover can no longer close. Sometimes the fastenings can no longer function as a result.

Parchment is extremely sensitive to fluctuations in humidity, resulting in the shrinkage of parchment covers. A warped book easily gathers dust in its gaping parts. Distortion of the hinged parts almost always causes damage to the construction because the book is forced when being opened or closed.

The spine should have a straight to rounded shape. The curved shape of the spine is dependent on the type of cover and the era when the book was bound. Earlier book covers mostly have straighter backs than nineteenth-century covers. Archival covers are more likely to have straight backs.

Through use the curvature can, over time, become flattened and even concave. With a hollowed back the book can no longer function as it should. Because of the altered shape the leaves protrude at the front, creating extra pressure on the hinges.

Sometimes the binding method promotes the skewed shape and distortion of books, for example, if a book has no boards. This is not considered as damage, but this kind of book does require adapted storage.

CAUSES

- Construction faults or the use of insufficiently durable materials
- Injudicious handling
- Fluctuating climatic conditions
- Incorrect storage
- Disasters (water damage, war damage)

SEE

- Mechanically adhered leaves resulting from warping of cover or book block: **C16** Adherence

MODERATE

- Slight warping of the book cover
- Slight warping of the book block
- In spite of the warping, the book is still able to stand or lie between other books on the shelf.



9.1

Parchment covers which are no longer completely straight as the result of climatic fluctuations

SERIOUS

- Significant warping of the book cover
- Significant warping of the book block
- Because of the warping the book can no longer stand or lie correctly between other books.



9.2

Seriously warped and damaged book resulting from a disaster

NO ISSUES WITH HANDLING

- The book block is protected: it remains covered and does not protrude.
- The warping does not hamper the opening and closing of the book.
- The book opens without resistance and the warping exerts no extra pressure on the construction of the spine.
- The book can be consulted without the risk of material loss or new damage.

MODERATE



9.3

Books warped by water damage



SERIOUS



9.4

Comics which have been warped as a result of slipping obliquely



HANDLING WILL WORSEN THE DAMAGE

- The book block is unprotected: it is no longer completely covered or it protrudes.
- The warping hampers the opening and closing of the book.
- The book does not open without resistance and the warping creates extra pressure on the spine construction.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



9.5

Book block with damage caused by use



SERIOUS



9.6

Parchment cover where the rounded back has become concave





The bands are the backbone of a book onto which the gatherings are sewn. They can be made of straps of leather, strips of parchment, string, linen bands or gauze. Together with the end leaves and the spine lining they provide the connection between the book block and the covers.

The bands are subject to the greatest strain at the hinges. If the material used is not so strong or worn, the hinge is often the first place where the bands break.

The condition of the bands can only be judged if they are visible because the covering material is damaged or because the hinges are torn. Very occasionally it is possible to look at the bands from the book block between the gatherings.

Not all books have bands. A book block can also be sewn without bands or the leaves can just be glued.

CAUSES

- Construction faults or the use of insufficiently durable materials
- (Injudicious) handling

SEE

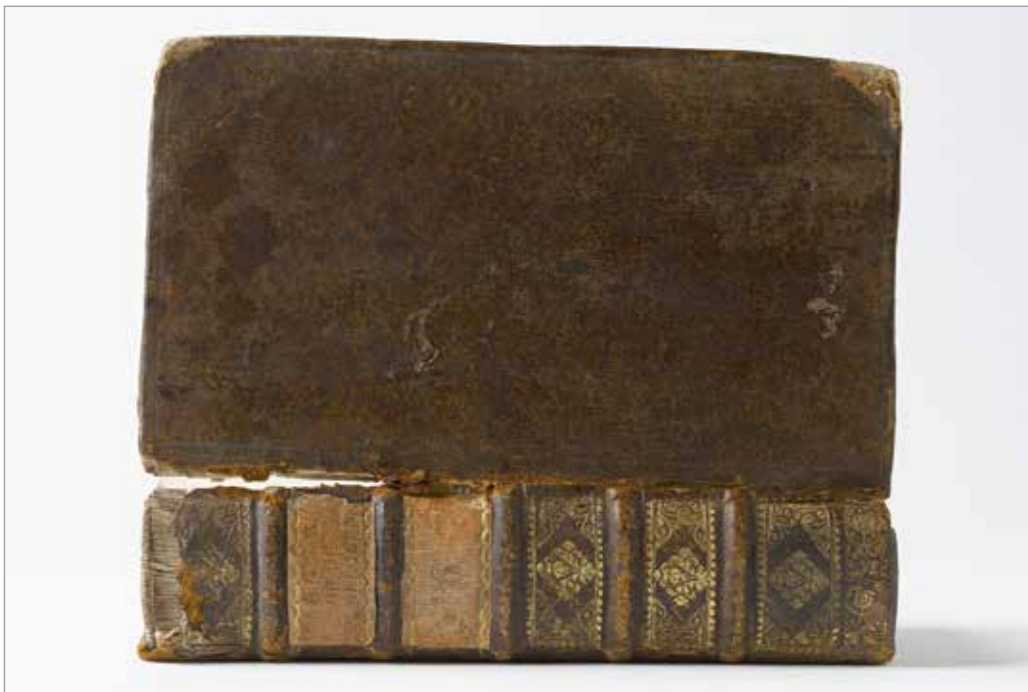
- Torn covering material: [A5](#) Loose parts on the book cover
- Missing covers: [A6](#) Missing parts from the book cover

SEE ALSO

- [B11](#) Adhesion of leaves and gatherings

MODERATE

- Less than half the bands of one cover are broken or weak at the hinges.
- Vulnerable bands or tackets
- Torn hinges
- End leaves partially loose, loose waste sheets or loose spine lining



10.1

Cover where two of the five bands are broken at the hinge on the front

SERIOUS

- More than half of the bands of one cover are broken or weak at the hinges.
- One or two completely broken off covers (loose from the book)
- Bands or tackets broken on the spine
- Incomplete or missing bands or tackets
- Completely loose end leaves, loose waste sheets, loose or missing spine lining



10.2

Book cover where all bands are broken in the hinge on the back and where moreover the bands on the spine are weak

NO ISSUES WITH HANDLING

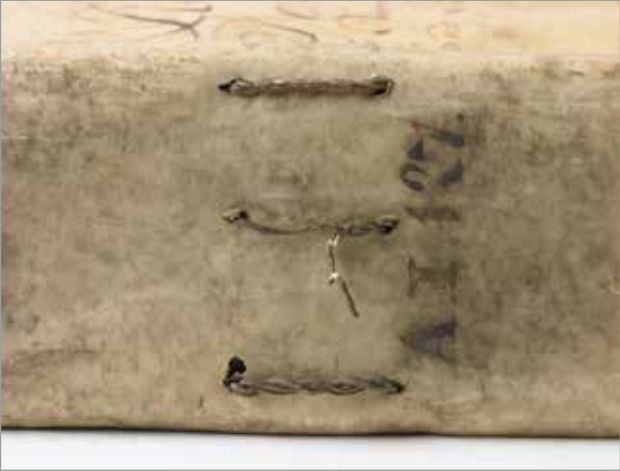
- The weak or broken bands do not hamper the opening and closing of the book.
- There is no risk that the bands will break further or that a cover will become loose.
- The book can be consulted without the risk of material loss or new damage.

MODERATE



10.3

Parchment cover with weak and damaged tackets



SERIOUS



10.4

Book cover with all the bands in the hinge broken and the pastedown is loosened, but where the wooden board remains in place thanks to the end band core.



HANDLING WILL WORSEN THE DAMAGE

- The weak or broken bands hamper the opening and closing of the book.
- There is a chance that the bands break further or that covers become detached.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



10.5

Modern linen cover construction where the book block is no longer properly attached to the cover



SERIOUS



10.6

The book block has become detached from the cover





Leaves or gatherings detach due to broken sewing, rusted staples, broken tackets or glue failure in the spine. They are then vulnerable to contamination and mechanical damage.

For centuries, gatherings were sewn, often with bands to strengthen the spine. From the nineteenth century onwards gatherings were also attached using metal staples on a gauze.

After the Second World War, lumbecking became popular; this method relies on holding loose leaves together with a layer of glue in the spine.

For archival covers and books for daily use (paperbacks, almanacs), the gatherings are also connected directly to the covering material with the help of tackets (twisted strips of parchment, leather or strings).

A somewhat rare binding technique is oversewing. Groups of several loose leaves are bound together utilizing an overhand stitch.

CAUSES

- Construction faults or the use of insufficiently durable materials
- Injudicious handling

SEE

- Weak or damaged bands:
B10 Damaged bands and adhesion to covers

MODERATE

- Up to five loose leaves in the book block
- Maximum one loose gathering
- Sewing locally damaged, weak or worn
- Traces of rust on staples (with a book block that is stapled onto bands)



11.1

Book in which the sewing of the first gathering has become loose

SERIOUS

- More than five loose leaves in the book block
- More than one loose gathering
- Sewing broken in several places (the book block loses shape and cohesion)
- Adhesion failure (with a lumbecked book block)
- Rusty and fragile staples (with a book block that is stapled onto bands)



11.2

A lumbecked book where there is no longer any adhesion to the glue and all the leaves are loose

NO ISSUES WITH HANDLING

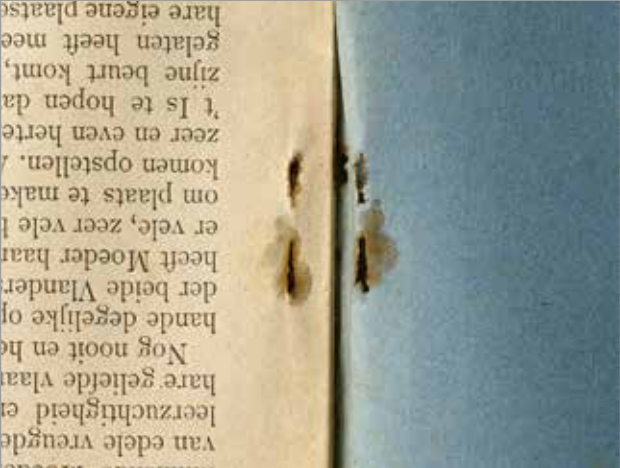
- The adhesion problem does not hamper the opening and closing of the book.
- The spine of the book block retains its cohesion and shape.
- The book block is protected: leaves or gatherings do not protrude.
- There is no risk that the sewing will further loosen or break.
- The book can be consulted without risk of material loss or new damage.

MODERATE



11.3

Rusted staples that no longer provide effective fastening



SERIOUS



11.4

A book block where the sewing is broken between the oversewn groups, but where the overhand stitches of the individual groups are intact



HANDLING WILL WORSEN THE DAMAGE

- The adhesion problem hampers the opening and closing of the book.
- The spine of the book block loses its cohesion and shape.
- The book block is unprotected: leaves or gatherings protrude.
- There is a chance that the sewing will further loosen or break.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



11.5

Two books each with less than five loose leaves



SERIOUS



11.6

Book block where its cohesion is under threat from seriously damaged sewing and damaged bands





DAMAGE TO THE BOOK BLOCK

A book block consists of loose leaves or folded sheets of parchment or paper. Both materials are subject to ageing processes and sensitive to moisture, heat and changes in climatic conditions.

Injudicious handling should not be underestimated as a cause of damage. This may include damage through use or mechanical damage, inadequate preservation, pest or water damage in combination with mould growth. War damage is often spectacular.

A separate problem is intrinsic decay, a degradation process that takes place even when a book is kept under good climatic conditions and is not used or consulted. Forms of intrinsic decay stem from acidified paper, ink corrosion and copper corrosion. Good storage conditions can slow down but not stop these processes.

C 12 DUST AND SURFACE DIRT

Dust and dirt on the book block are often the result of intensive use. It can also be an indication of the quality of storage conditions and the regularity of library maintenance. Dust and dirt are an ideal substrate for biological attack by moulds and pests.

C 13 HARMFUL TAPES AND REPAIRS

Harmful tapes and old repairs to the book block can cause serious damage. Softeners from the glue layer penetrate the paper and can become sticky. Poor repairs cause tension in the paper and instigate new damage.

C 14 LACUNAE, TEARS AND CREASES

The paper or parchment of the book block can be damaged in many ways. Lacunae, tears and creases are the most important forms of damage. They can arise through a variety of causes, such as improper use, incorrect storage, mould or pest damage.

C 15 FELTING

Moisture or mould will detrimentally affect paper whereby it loses its stiffness. The glueing of the paper may be affected by micro-organisms. The paper structure itself may also be affected. This internal chemical process is called felting.

C 16 ADHERENCE

Due to the effect of moisture, the leaves of a book can sometimes no longer be separated. This is called adherence. A page can be stuck locally, but it is also possible that entire pages stick to each other or that complete book blocks can no longer be opened.

C 17 ACIDIFICATION OF THE END LEAVES

End leaves have a constructive function and are therefore usually made of a different, sturdier paper than the book block. The composition of the paper can cause acidification of the end leaves. Also the impact of the underlying materials, such as the covering material and the boards, can lead to acidification of the end leaves.

C 18 ACIDIFICATION OF THE BOOK BLOCK

Acidic raw materials are a major problem with paper book blocks dating back to about 1840. The cause lies in the introduction of wood as a raw material for paper making, rather than the rags used in the previous centuries.

C 19 FOXING

Brown speckles in paper are called foxing. They indicate damp storage conditions in the past, often in combination with an acidic material or metal particles.

C 20 INK CORROSION AND COPPER CORROSION

To write or print texts and images, ink has been used. Modern printing ink is usually stable, but the iron gall ink in manuscripts can become unstable and lead to ink corrosion. In the worst case, the letters literally fall out of the paper. The same applies to cupric inks (blue and green), which were used mainly for colouring illustrations. These can cause copper corrosion.



Dust in books is usually a result of intensive use, but it can also indicate poor storage conditions or a poor cleaning routine in a library. Insects, rodents or birds cause pollutants in the form of burrowed waste, residues of gnawed material, excretion products or body remnants.

Dust and dirt can be loose and easy to remove. However contamination can also be attached to the parchment or paper of the book block or penetrate into it. Dust is capable of retaining moisture and then forms a suitable microclimate for moulds. Dust diffuses when books are handled. It transfers via handling to clean leaves.

CAUSES

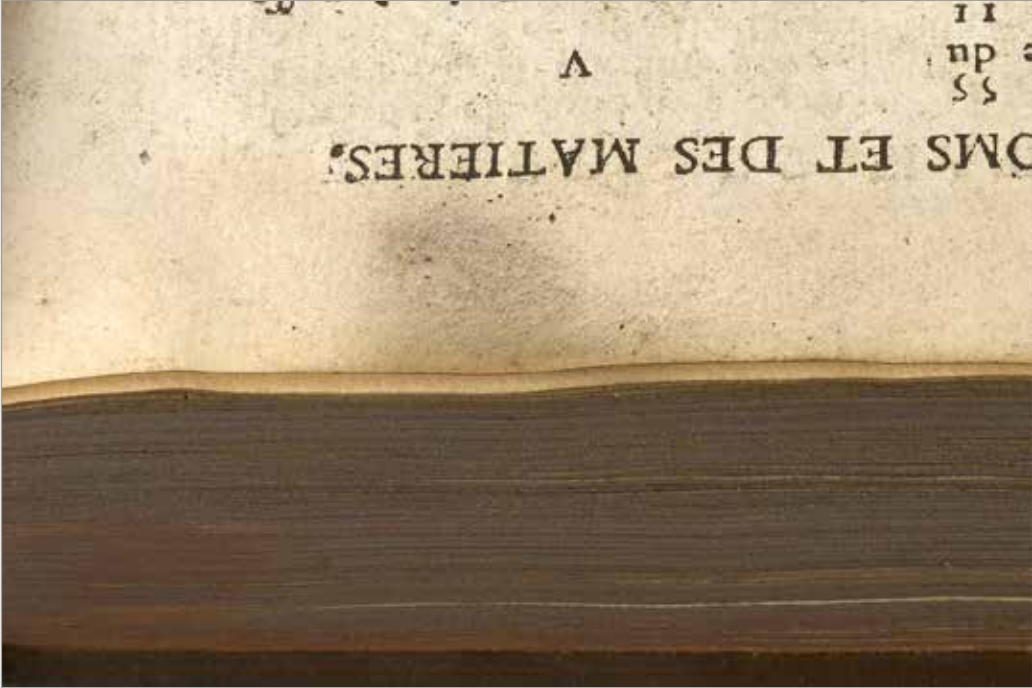
- Insufficient cleaning routine
- Poor storage conditions
- Incidents, such as a renovation
- Mould attack
- Pest damage

SEE ALSO

- [A1](#) Dust and surface dirt on the book cover
- [C16](#) Adherence
- [D21](#) Mould damage
- [D22](#) Pest damage

MODERATE

- Dust or surface dirt clearly visible along the edges of the leaves
- Dust or surface dirt occasionally visible on leaves in the book block or in the gathering folds
- Dust or surface dirt that is released onto the hands, a book pillow or the surroundings



12.1
Dirt that has penetrated locally in the book block

SERIOUS

- Dust or surface dirt prominently visible on many leaves in the book block, in the gathering folds or in the spine of the book
- Loose dirt in the spine of the book block can become dislodged and fall down or move around in another way
- Dust or surface dirt that is transferred to the hands, a book pillow or the surroundings



12.2
Completely soiled book block

NO ISSUES WITH HANDLING

- Dust and surface dirt are easy to remove.
- Dust and surface dirt do not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



12.3

Dirt that has fallen into the gathering fold



SERIOUS



12.4

Seriously soiled book block



HANDLING WILL WORSEN THE DAMAGE

- Dust or surface contamination is not easy to remove.
- Dust or surface contamination hampers the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



12.5

Dirt between the last leaves of a book block due to moulds that are no longer active



SERIOUS



12.6

Significant amount of loose and caked dirt in a book block



C13 DAMAGE TO THE BOOK BLOCK | Harmful tapes and repairs



Tapes and old repairs to the book block are harmful if they react with the paper or parchment on which they are used. Adhesive tapes and labels consist of a synthetic carrier and an adhesive layer. Both can contain softeners.

The adhesive becomes sticky, migrates into the paper or parchment, discolours and hardens. The discolouration progresses from colourless to light yellow to dark brown. Eventually the adhesive layer detaches from the carrier. Other glue types, such as animal glue, can also migrate into the paper or parchment and cause damage by hardening and becoming brown.

The carrier of an adhesive tape can be a source of damage if it is made of an acidic material, such as some gum tapes. This causes local acidification of the paper or parchment.

It also happens that a repair is too thick or does not have the proper flexibility. Then tension is created in the original parchment or paper.

Sound repairs are reversible: they can be removed without damage. Furthermore the aesthetic side of a repair is in effect of secondary importance. Some repairs may be unattractive, because the colour or material differs significantly from the substrate, but in fact are not harmful to paper or parchment.

CAUSES

- Repairs with material not suitable for preservation, for example adhesive tape or acidic paper
- Repairs that do not have the appropriate thickness or utilize an inappropriate application technique relative to the damage and the original material

SEE ALSO

- [A4](#) Harmful tapes and repairs to the book cover

MODERATE

- Harmful tapes or repairs to the book block with a total area of less than 100 cm² (e.g. 10 x 10 cm)

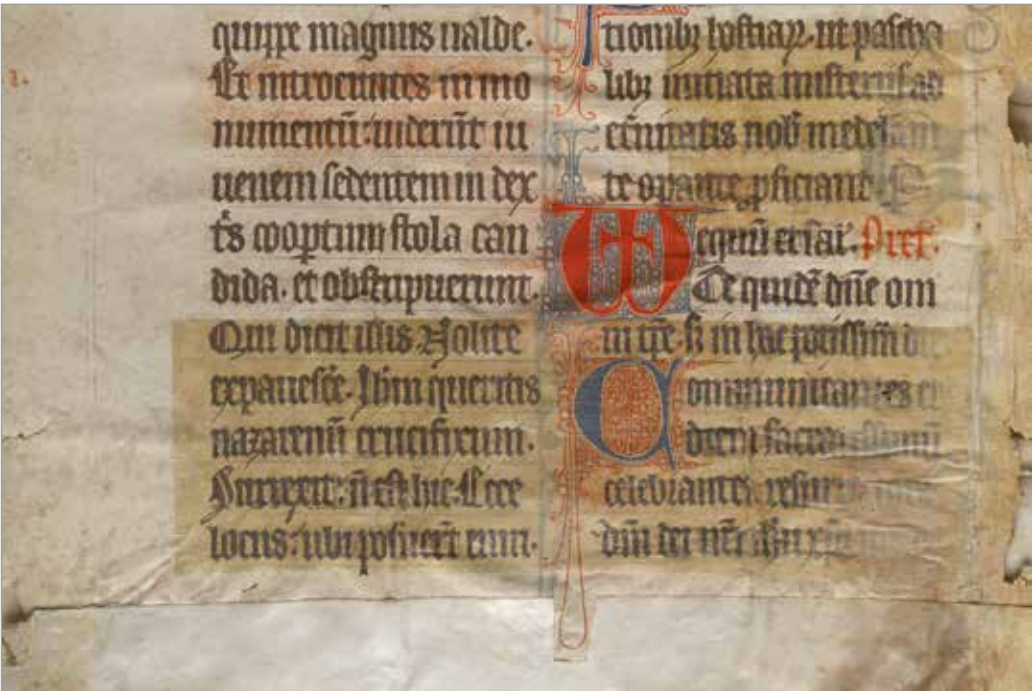


13.1

Loose leaf in a book block that is secured with a piece of adhesive tape

SERIOUS

- Harmful tapes or repairs to the book block with a total area of more than 100 cm² (e.g. 10 x 10 cm)



13.2

A leaf that has been injudiciously repaired by adhering over it large pieces of transparent paper

NO ISSUES WITH HANDLING

- Harmful tapes and repairs do not stick to other parts of the book or other leaves.
- Harmful tapes and repairs do not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



13.3

Archival cover in which the first leaf is repaired with adhesive tape



SERIOUS



13.4

Children's book that has been repaired with wide strips of adhesive tape



HANDLING WILL WORSEN THE DAMAGE

- Harmful tapes or repairs stick to other parts of the book or other pages.
- Harmful tapes or repairs hamper the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



13.5

Paper cover attached to the first page whereby it no longer opens completely due to a repair with adhesive tape in the hinge



SERIOUS



13.6

Photo album in which the torn, acidic paper has been repaired in many places with adhesive tape





C14 DAMAGE TO THE BOOK BLOCK | Lacunae, tears and creases

The paper or parchment of a book block can be damaged in many ways. Worn dog-eared corners are not in themselves a serious form of damage, but they can make the book block thicker (bulking). Dirt can then penetrate more easily. A leaf can often protrude from the book block due to larger folds over the entire page length, increasing the risk of mechanical damage.

When many leaves have been folded incorrectly or fall into the spine fold, bulking occurs in the spine. As a result, the entire cover is subjected to forces resulting in warping. This form of damage is common for atlases utilizing pasted-in maps.

Uneven, corrugated paper or parchment often results from moisture ingress. However it should be carefully noted that with relief printing there is a characteristic expansion of the paper that is not related to moisture damage, but is a consequence of the production process; parchment always has a natural undulation.

Frayed edges are small tears on the leaf edge. This should not be confused with deckle edges, the jagged edge of handmade paper. Often, frayed edges appear on leaves that protrude due to folding or loosened sewing. It usually relates to slight damage. Coarse frayed edges, which give rise to interlocking leaves, are a more tangible form of damage.

Larger tears and cuts are often the result of injudicious consultation of the book, sometimes with adherence as the underlying cause. Special care is required for folding plates as they are more vulnerable to paper damage.

This can even lead to parts becoming detached completely. In addition, wilful human action plays a role here; for example, provenances are sometimes cut from a title page. Also moulds and pests can affect the parchment or paper, resulting in lacunae.

CAUSES

- Injudicious handling
- Incorrect storage
- Damaged sewing
- Mould attack
- Pest damage

SEE ALSO

- B9 Warping of book cover and book block
- C12 Dust and surface dirt on the book block
- C13 Harmful tapes and repairs to the book block
- C15 Felting
- C16 Adherence
- C18 Acidification of the book block
- C20 Ink corrosion and copper corrosion
- D21 Mould damage
- D22 Pest damage

MODERATE

- Up to five leaves with tears, lacunae, frayed edges, weak spots, loose parts or creases
- No text or image loss



14.1

A single tear in a leaf with a plate

SERIOUS

- More than five leaves with tears, lacunae, frayed edges, weak spots, loose parts or creases
- Text or image loss



14.2

Numerous tears and severely frayed edges on acidic newspapers

NO ISSUES WITH HANDLING

- The tears are not in a place that is gripped when being handled.
- The tears do not easily become enlarged.
- The paper or parchment damage does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



14.3

A single torn corner in a book block



SERIOUS



14.4

Spine of an atlas with a number of collapsed maps with creases



HANDLING WILL WORSEN THE DAMAGE

- The tears are located in a place that is gripped when handling.
- The tears are easily enlarged.
- The paper or parchment damage hampers the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



14.5

Book with only two large tears, but which are very vulnerable to becoming enlarged



SERIOUS



14.6

Book block which has suffered severe fire damage





Felted paper feels soft and woolly (felt-like). The stiffness of the paper has dwindled and the fibres easily fall apart. In particular the edges of a leaf often appear dilated and frayed. When handling felted paper, pieces come loose easily and can leave lacunae.

In the presence of moisture, the sizing of the paper can dissolve and the cellulose fibres may swell and shrink. In this way the fibres gradually disintegrate. Following moisture damage, moulds can also deleteriously affect the sizing or the cellulose.

CAUSES

- Moisture (flooding)
- Mould attack
- Poor storage conditions
- Climatic conditions

SEE ALSO

- **C14** Lacunae, tears and creases
- **D21** Mould damage

MODERATE

- Up to five felted leaves, either over their complete surface, or limited to their edges or corners
- No text or image loss



15.1

Book with a few felted corners of paper

SERIOUS

- More than five felted leaves, over their entire surface, or limited to their edges or corners
- Text or image loss



15.2

Seriously felted paper in a parchment book cover

NO ISSUES WITH HANDLING

- Paper felting does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



15.3

Book block with incidental felting

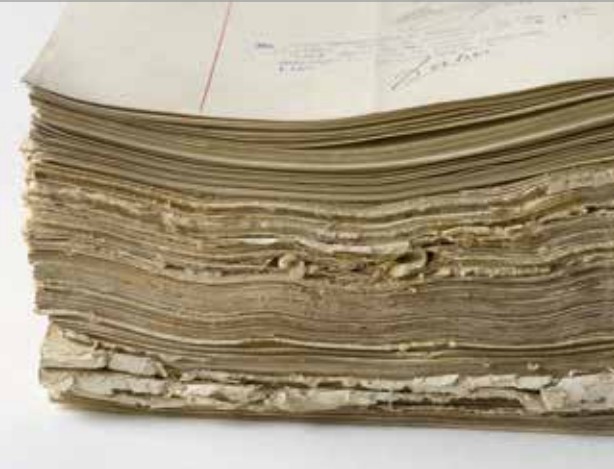


SERIOUS



15.4

Book block with more than five leaves with felted edges



HANDLING WILL WORSEN THE DAMAGE

- The felting hampers the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



15.5

Book with a few leaves fragmented due to felting



SERIOUS



15.6

Book block with extensive damage due to felting





C16 DAMAGE TO THE BOOK BLOCK | Adherence

Adherence causes leaves to stick together. Through the action of moisture on paper, constituents used during production, such as fillers and adhesives, can dissolve. If the book block later dries out, there is a significant likelihood that the sheets of paper will stick together. The constituents of parchment can also cause sticking leaves.

An exceptional type of damage is mechanical adhesion. This manifests itself as a large number of leaves interlocking, for example through damage to the edge causing multiple leaves to curl together. War damage can also initiate associated problems, for example where a bullet pierces the book and it seems as though the leaves are stuck together.

- CAUSES**
- Poor storage conditions
 - Poor climatic conditions
 - Mould damage
 - Disasters (water damage, war damage)
- SEE ALSO**
- C14 Lacunae, tears and creases
 - D21 Mould damage

MODERATE

- Maximum of five leaves entirely or partially stuck together
- No text or image loss



16.1

Title page which cannot easily be opened because two leaves are stuck together

SERIOUS

- More than five leaves which are entirely or partially stuck together
- Text or image loss



16.2

Seriously adhered book block resulting from water damage, dirt and mould

NO ISSUES WITH HANDLING

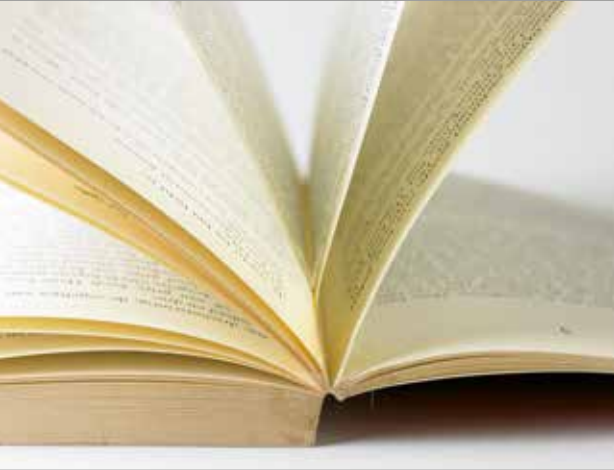
- The adherence does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



16.3

Adherence of a few leaves, rendering the text difficult to read



SERIOUS



16.4

Mechanical adhesion resulting from being pierced by a bullet



HANDLING WILL WORSEN THE DAMAGE

- The adherence hampers the opening and closing of the book.
- The book cannot be consulted without the risk of material loss or new damage.

MODERATE



16.5

Two adhered leaves in a modern paper book block



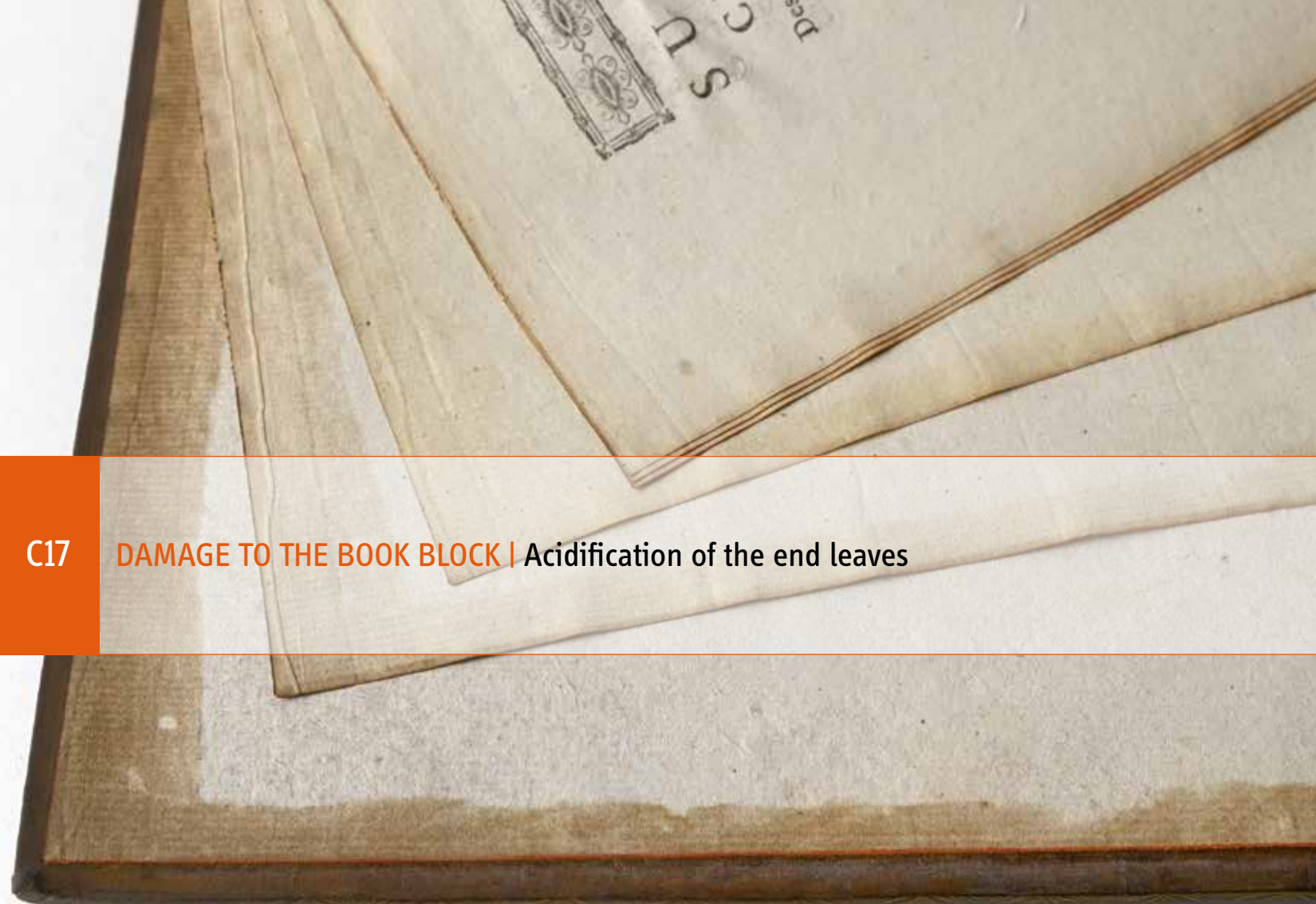
SERIOUS



16.6

Numerous adhered leaves resulting from water damage, rendering the contents partially illegible





C17 DAMAGE TO THE BOOK BLOCK | Acidification of the end leaves

Acidified end leaves are less strong and tear more swiftly against the hinges. Acidification of the end leaves can result from two causes. The paper used can become acidified because of its constituents. (For an explanation of this cause see [C18](#) Acidification of the book block.)

The paper can also become acidified through the impact of acidic boards or a turn-in of acidified leather to which the end leaves are attached. Boards are mostly cardboard or wood but their quality can be variable. Both wooden and cardboard boards can transmit acidification to the book block.

In the past, cardboard was produced by the bookbinder himself out of surplus materials from the bindery. Originally the basic material was rag paper. But after the introduction of wood pulp for paper production the boards were often made from acidic material. This can result in the acidification of the end leaves. Special acid-free cardboard has only been in existence for a few decades.

CAUSES

- Intrinsic ageing processes
- Use of raw materials containing lignin or alum-rosin sizing
- Boards containing lignin (wood, cardboard)
- Poor climatic conditions
- Air pollution

SEE

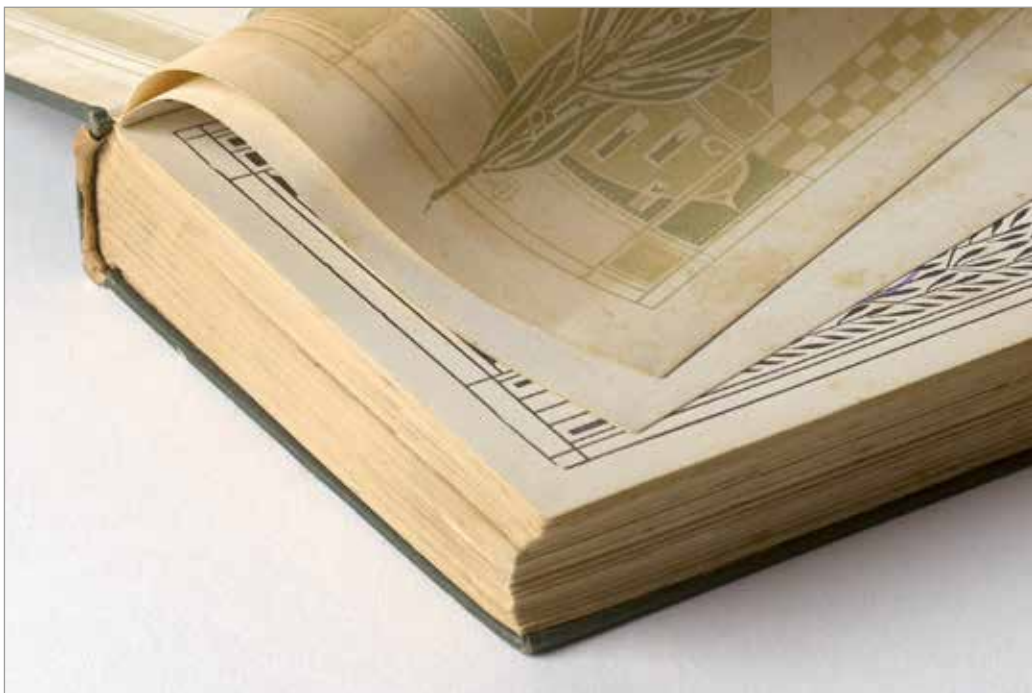
- Torn hinges: [B10](#) Damaged bands and adhesion to covers
- Brown discolouration in the form of small spots: [C19](#) Foxing

SEE ALSO

- [C14](#) Lacunae, tears and creases
- [C18](#) Acidification of the book block

MODERATE

- Initial discolouration of pastedowns or flyleaves
- Paper has a brittle feel but does not break when handled
- No text or image loss
- Strong hinge



17.1

Brown discolouration on the first page resulting from an acidic board

SERIOUS

- Advanced discolouration of pastedowns or flyleaves
- Odour ranging from vanilla to acetic acid
- Paper feels brittle to the touch and breaks on handling
- Text or image loss
- Weak or torn hinge



17.2

Pastedown that is seriously acidified by the impact of an acidic board and moisture

NO ISSUES WITH HANDLING

- The acidification of the end leaves does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



17.3

End leaves, which are acidic, have also caused discolouration to the first page of the text block

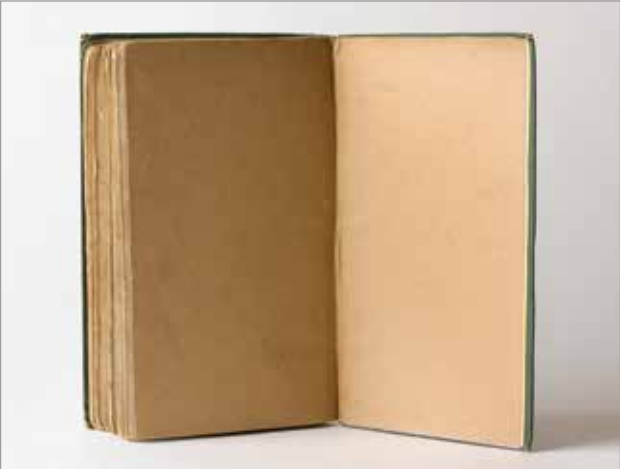


SERIOUS



17.4

End leaf which has been completely weakened by acidification



HANDLING WILL WORSEN THE DAMAGE

- The acidification of the end papers hampers the opening and closing of the book.
- The book cannot be consulted without the risk of material loss or new damage.

MODERATE



17.5

The woody content of the end paper has resulted in acid induced degradation leading to tearing of the hinge



SERIOUS



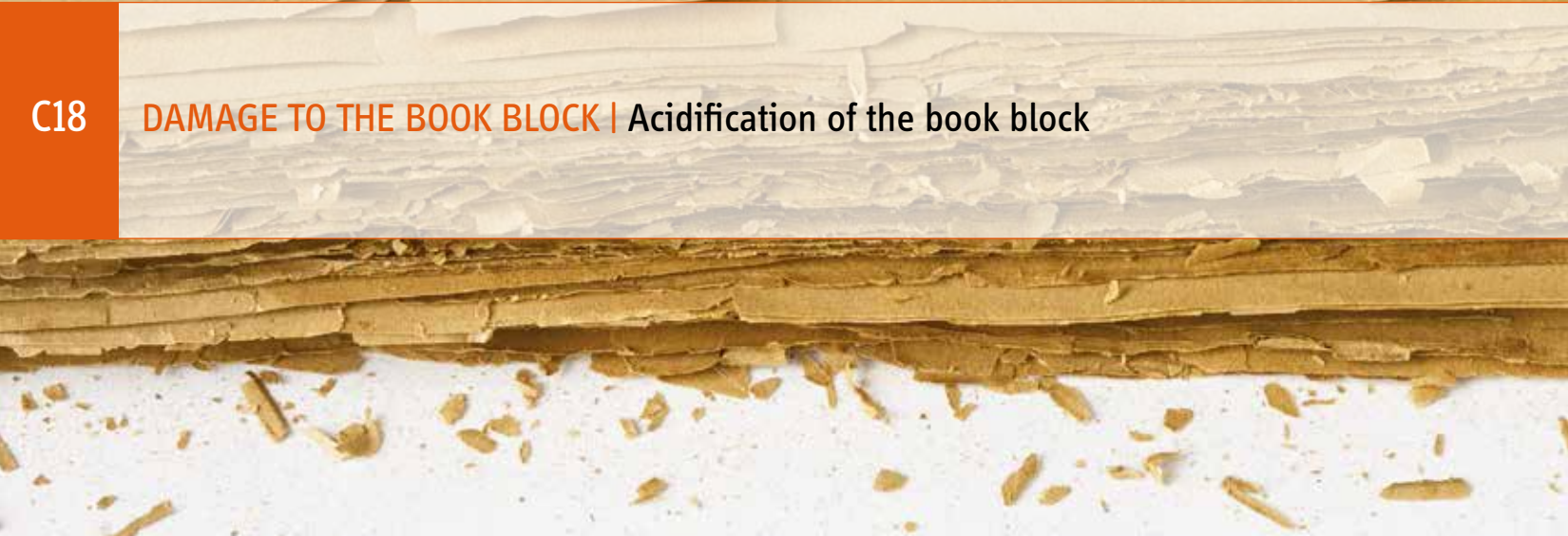
17.6

The woody content of the end leaf has resulted in acid induced damage





C18 DAMAGE TO THE BOOK BLOCK | Acidification of the book block



A typical feature of acidic paper is the odour: from vanilla to acetic acid. This is accompanied by discolouration of the paper from cream/ yellow to dark brown. The discolouration often starts along the edges of the paper. In an advanced stage there is total discolouration. Seriously acidic paper is brittle and breaks easily when handled. The extent of the acidic nature can be measured with a pH-pen, in combination with the hand fold number.

Acidic paper can occur as a result of the composition of the material. Originally paper was made from rags. In principle, this kind of paper does not become acidified.

From about 1840 wood pulp was the main raw material constituent in paper-making. Wood pulp contains lignin and that causes intrinsic decay of paper. Nowadays, the lignin can be removed from the paper pulp, but originally that was not the case.

Subsequently, in the mid-nineteenth century, alum-rosin size was often applied. This additive is also a contributory factor in the acidification of paper. Studies have shown that the acidic nature is most severe in paper from the period between 1870 and 1945.

Sheets of transparent paper, used to protect prints, are often acidic. This can be seen with browning and sometimes, too, with foxing. The paper has been made transparent by a vigorous milling of the fibres, in combination with acids. That stimulates internal degradation.

The internal acidic nature of paper gives rise to intrinsic decay. It is a process that is ongoing, even when a book is kept in good climatic circumstances and is not consulted. Poor storage conditions can accelerate the process.

CAUSES

- Intrinsic ageing processes
- Use of raw materials with lignin or alum-rosin size
- Poor climatic conditions
- Air pollution

SEE

- Brown discolouration in the form of small spots: [C19](#) Foxing

SEE ALSO

- [C14](#) Lacunae, tears and creases
- [C17](#) Acidification of the end leaves

MODERATE

- Initial discolouration of the paper in the book block
- Brittle paper that does not break when handled
- No text or image loss



18.1
Newspaper with preliminary yellowing along the edges caused by the acidic nature of the paper

SERIOUS

- Considerable discolouration of the paper in the book block
- Odour of vanilla or acetic acid
- Brittle paper that breaks when handled
- Text or image loss



18.2
Seriously acidic newspaper where the paper has become embrittled and breaks when handled

NO ISSUES WITH HANDLING

- The acidic nature of the paper in the book block does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



18.3

Acidic transparent paper in a book of prints



SERIOUS



18.4

Book showing all the characteristics of seriously acidic paper, except that the paper is not yet very embrittled and can still be handled



HANDLING WILL WORSEN THE DAMAGE

- The acidification of the paper in the book block hampers the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



18.5

Book block where the edges fragment when leafing through



SERIOUS



18.6

Seriously acidic book block where the leaves disintegrate with minimum handling



Foxing is a collective name for various types of discolouration. The speckling can be found over the entire surface of a leaf or be limited in area. Often these degenerative processes begin at the edges. The speckling can range from a millimetre to very large spots.

The spots may be different colours, from pale yellow to light brown to black. Sometimes only one page may contain foxing, whilst the preceding and following pages appear to be free from this foxing. The attack occurs mainly in paper, less in parchment.

The cause of foxing is not entirely understood. It is assumed that it is a form of attack by micro-organisms, which develop in an acidic environment in the presence of moisture.

Foxing often occurs where metal particles, stemming from the production, remain in the paper. The spots form due to chemical reactions between these particles, the paper and the air. Some printing inks appear to affect the development of foxing.

Foxing does not worsen with use of the item. Books with foxing can therefore be consulted.

CAUSES

- Intrinsic ageing processes
- Metal particles in the paper
- Acidic paper
- Moisture
- Mould attack
- Poor storage conditions

SEE

- Speckling by moulds: [D21](#) Mould damage

SEE ALSO

- [C17](#) Acidification of the end leaves
- [C18](#) Acidification of the book block

MODERATE

- Light speckling, often starting along the edges of paper
- Speckling on a few leaves in the book block
- No text or image loss

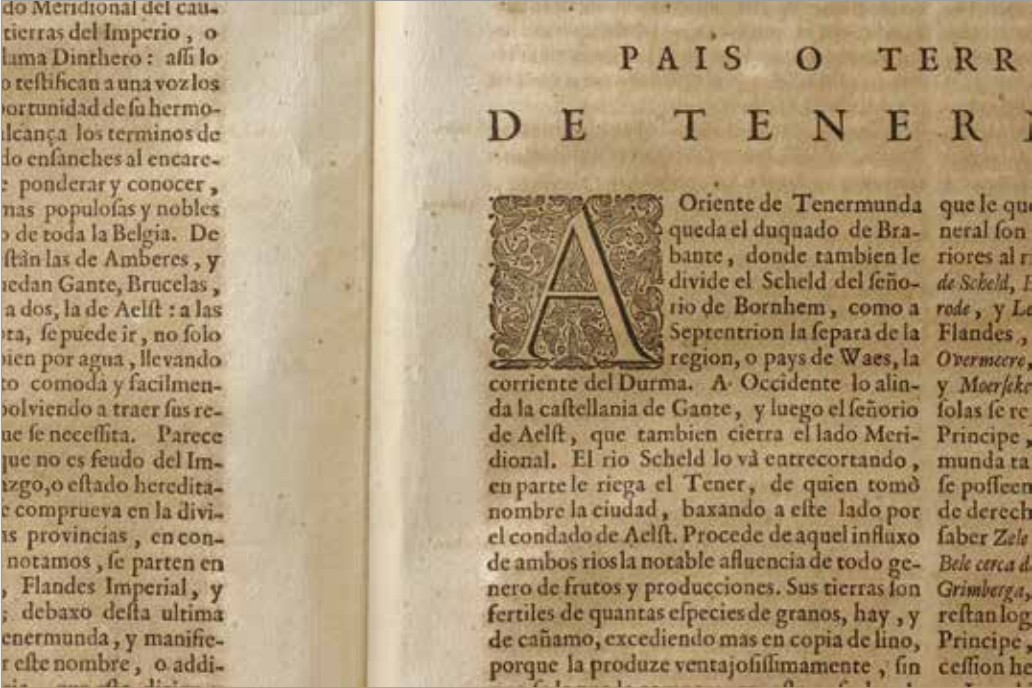


19.1

Print with transparent paper, both harmed by foxing

SERIOUS

- Spotting to an extent where there is an almost even darkening of the paper
- Spotting on most of the pages of the book block
- Text or image loss



19.2

Book block where the text sections are severely browned

NO ISSUES WITH HANDLING

- Paper affected by foxing can always be handled, regardless of the degree of discolouration.

MODERATE



19.3

Book edge showing foxing



SERIOUS



19.4

Book block made with woody paper showing foxing



HANDLING WILL WORSEN THE DAMAGE

- Not applicable. Foxing does not affect the handling of the paper or book and does not lead to material loss or new damage.



C20 DAMAGE TO THE BOOK BLOCK | Ink corrosion and copper corrosion

Ink corrosion and copper corrosion can occur in texts written with iron gall inks and inks containing copper. Modern printing inks do not cause this damage. Although parchment can be affected by ink and copper corrosion, the damage occurs most frequently with paper. Ink corrosion is serious when at least five leaves are affected to a greater or lesser extent.

The first signs of ink corrosion are seepage of the ink outside the written or set lines. Ink corrosion goes hand in hand with discolouration of the ink. The discolouration extends from light brown to almost black. Fluorescent (UV) light indicates if a material is sensitive to ink corrosion, demonstrated by the paper glowing around the text. At this early stage there is no indication of damage.

At a later stage ink penetration is demonstrated by text appearing on the back of the leaf. There is also browning perceptible outside the text. At an advanced stage, fractures occur in the paper at the places where the ink lines run. Finally, perforations can occur as the text literally falls out of the paper.

Ink corrosion is the manifestation of ink instability where the ink's principal components are iron sulphate and gall nut extract. The iron sulphate causes a chemical process that degrades the paper. In addition the blurring of some types of iron gall ink is due to its composition. The blurring is an irreversible process: however, faded text is sometimes rendered more legible under UV light.

Copper corrosion has analogous origins. It occurs with copper-containing inks (blue and green) used in illustrations and maps. The discolouration resulting from copper corrosion ranges from light green to black. Similarly, with copper corrosion, parts of the paper can become brittle and fall out of the paper at an advanced stage.

Ink corrosion and copper corrosion are forms of intrinsic decay. These are degradation processes which can be slowed down when a text is kept under good climatic conditions and is not consulted. Poor storage conditions can speed up ink and copper corrosion.

CAUSES

- Intrinsic ageing processes
- Composition of copper or iron gall ink
- Poor climatic conditions

SEE ALSO

- C14 Lacunae, tears and creases

MODERATE

- Up to five leaves with greater or lesser damage to paper or parchment (penetration, seepage, fractures or lacunae)
- No text or image loss
- Discolouration of the text ink from brown to very dark brown to black
- Discolouration of the green in prints of light and bright green to grey-green to brown
- Seepage of the ink
- Text or ink discolouration visible on the back of the leaf



20.1

Early signs of ink corrosion in a manuscript, with penetration on a few leaves

SERIOUS

- More than five leaves with greater or lesser damage to paper or parchment (penetration, seepage, fractures and lacunae)
- Text or image loss
- Discolouration of the text ink from brown to very dark brown to black
- Discolouration of the green in illustrations of light and bright green to grey-green to brown
- Seepage of the ink
- Text or discolouration visible on the back of the leaf



20.2

Early signs of ink corrosion with penetration throughout the entire book block

NO ISSUES WITH HANDLING

- The ink or copper corrosion does not hamper the opening and closing of the book.
- There is no occurrence of new fracture lines when consulting the book.
- The book can be consulted without risk of material loss or new damage.

MODERATE



20.3

Early signs of copper corrosion in the green sections of a map (front and back)



SERIOUS



20.4

Ink corrosion in all leaves of a book block



HANDLING WILL WORSEN THE DAMAGE

- The ink or copper corrosion hampers the opening and closing of the book.
- New fracture lines occur when consulting the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



20.5

Ink corrosion in the frames of some leaves of a book block



SERIOUS



20.6

Manuscript with severe ink corrosion in many leaves: the letters are falling out of the parchment



D

BIOLOGICAL DAMAGE

Mould and pest damage are the result of poor storage conditions, such as a space that is not technically suitable for the preservation of books, overdue maintenance or a lack of regular cleaning. In addition a disaster can be the cause of this kind of damage.

When biological damage is determined it is important to find out if the cause of the damage has been rectified and whether the moulds or pests are still active or present. Only after testing has been carried out and any corrective measures have been taken, may the all-clear signal be safely given.

D21 MOULD DAMAGE

Like dust and dirt, paper, leather and parchment are good substrates for some moulds. Mould spores are latently present at all times: all they require are the right climatic conditions to germinate. If the ambient relative humidity becomes too high, mould growth will be instigated, even when the relative humidity fluctuation is short-lived. However, there are also moulds active in dry conditions.

D22 PEST DAMAGE

Storage conditions such as high temperature, high humidity and a dirty environment attract insects. Mould growth is also a nutritional substrate for insects, and furthermore insects are often food for rodents. Construction defects in a storage facility, such as badly closing doors and windows, facilitate the penetration of pests.

Met 't Kruis in
Zoo varen wij,
Door 't wereldtij
Ten hoogen Hemel



Mould attack is recognizable by spots and discolouration, mostly in pastel tones. The spots often overlap. More active and mature mould forms mould threads visible as fluff in various colours. Moulds eventually result in the digestion of the paper, resulting in lacunae and loose parts. In the case of felting there is a breakdown of the cellulose in the paper.

Traces of moulds are present everywhere. Once in a fixed location, spores can develop into mould colonies. Conditions conducive to this are:

- The presence of a substrate, such as dust, paper, leather, parchment or sizing in paper.
- A favourable temperature. This varies according to the moulds, but is usually higher than 24 °C.
- A favourable relative humidity: usually higher than 60%, although there are also moulds that thrive in dry conditions.

Many paper moulds are surface moulds and thrive best if the paper is slightly acidic. Once the surface is affected, they can easily continue to grow, even after the relative humidity has fallen to a prescribed safe value.

Moulds and the substances that they secrete can be harmful to humans. Using a swab specimen in conjunction with a suitable substrate, it is possible to check whether a detected mould is active. With an active mould it can be determined what type it is and what its specific living conditions are. This information helps in combating the problem and identifying the measures required to protect the health of those in the vicinity.

CAUSES

- Poor cleaning routine
- Poor storage conditions
- Poor climatic conditions
- Pest damage

SEE

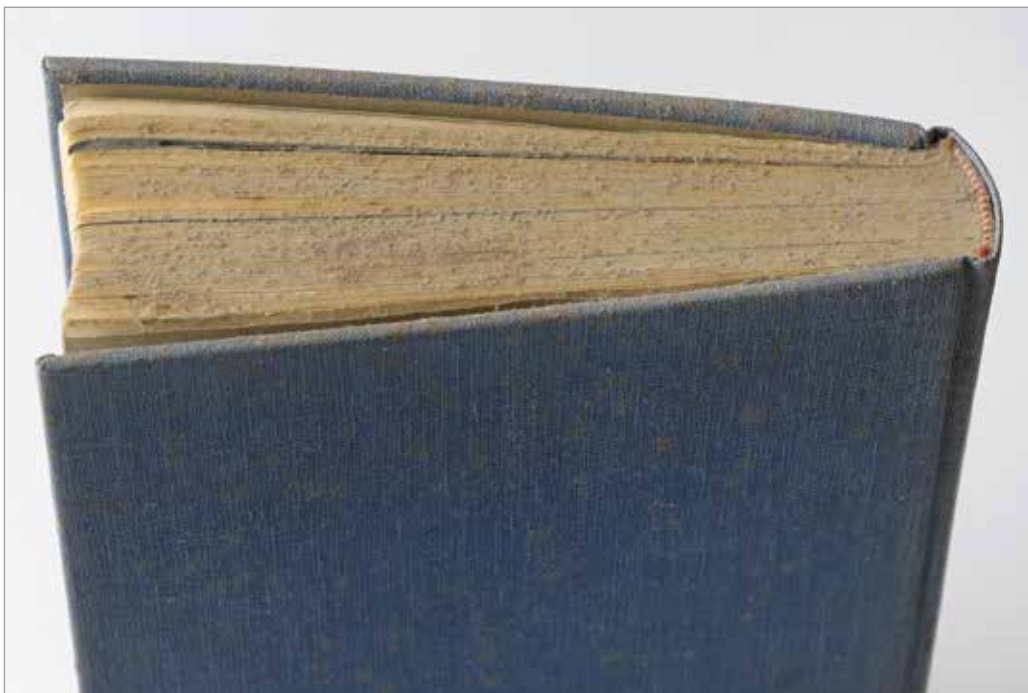
- Paper damage: **C14** Lacunae, tears and creases; **C15** Felting
- Brown speckled stains in the paper: **C19** Foxing

SEE ALSO

- **A1** Dust and surface dirt on the book cover
- **C12** Dust and surface dirt on the book block

MODERATE

- Small mould spots on the book cover or in the book block, often in places where dust is present
- Up to five leaves of the book block are affected
- Small discolouration on the cover or in the book block due to mould



21.1

Head edge of a book with dust and mould

SERIOUS

- The material used for the cover or more than five leaves of the book block are affected and weakened to a greater or lesser extent
- Moulds clearly visible on the cover or in the book block, in patches larger than fluff or in a different form



21.2

Books affected by advanced mould growth

NO ISSUES WITH HANDLING

- The mould has been tested and is not active.
- The mould has left no harmful metabolic residues.
- The mould does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.



21.3

A swab specimen with a suitable substrate gives information about the mould activity



HANDLING WILL WORSEN THE DAMAGE

- The mould has not yet been tested.
- The mould appears to be active after testing.
- The mould has left harmful metabolic residues.
- The mould hampers the opening and closing of the book.
- The book cannot be consulted without risk of material loss or new damage.

MODERATE



21.4

Stains in various colours due to mould growth in the paper

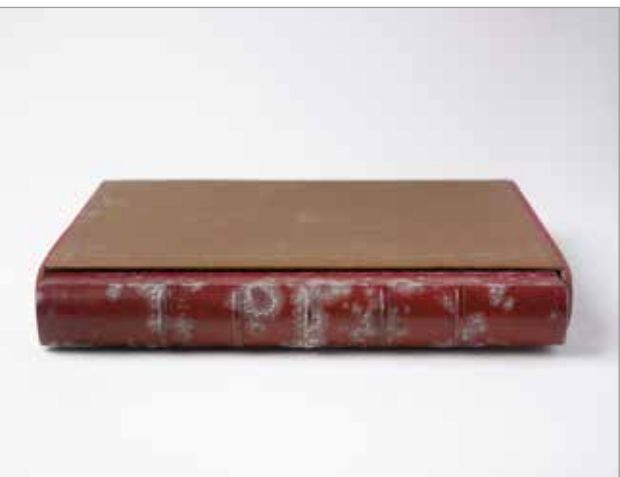


SERIOUS



21.5

Book with fluffy, active mould growth





The presence of pests can be recognized by gnawing damage, drill holes, excrement and remains of dead creatures. Pest damage falls into two categories: damage by insects and damage by rodents, such as mice and rats.

Conditions in which insects can exist are the presence of food (paper, wood, sizing), sufficient oxygen, an increased temperature and a heightened relative humidity. Furthermore, some insects also thrive in drier surroundings, like the firebrat.

Insects are by nature photophobic and prefer to live in chinks, cracks and crevices. The larvae of some insects, like the woodworm, will eat their way through a book. Insects with the greatest incidence in libraries are the dust louse, the fur moth, the clothing moth, the brown house moth, the woodworm, the German cockroach, the American cockroach, the silverfish, the grey silverfish, the firebrat, the fur beetle, the larder beetle, the old house borer and the common carpet beetle. In turn, insects themselves are food for mice and rats.

In case of doubt about the presence of pests, an investigation must always be carried out. For example, using traps, we can investigate whether insects are still active. Determining the specific species of pests is important in combating them.

CAUSES

- Overdue maintenance
- Poor cleaning routine
- Poor storage conditions
- Poor climatic storage conditions
- Mould attack

SEE

- Paper damage: **C14** Lacunae, tears and creases, **C15** Felting

SEE ALSO

- **A1** Dust and surface dirt on the book cover
- **C12** Dust and surface dirt on the book block
- **D21** Mould damage

MODERATE

- A few small boreholes or other damage visible on the cover
- Up to five leaves of the book block are weakened and damaged or discoloured



22.1

Damage by woodworm in a paper book block

SERIOUS

- Extensive material damage: boring holes, material loss of the book cover
- More than five leaves of the book block are damaged and weakened to a greater or lesser extent



22.2

Rodent damage and excrement contamination by rats or mice in a paper book block

NO ISSUES WITH HANDLING

- The presence of the pests has been investigated and they are no longer present or active.
- The pests have left no harmful metabolic products or other residues.
- The pest damage does not hamper the opening and closing of the book.
- The book can be consulted without risk of material loss or new damage.



22.3

An insect trap with the appropriate bait provides information about the activity of the insects being sought



HANDLING WILL WORSEN THE DAMAGE

- The presence of the pests has not yet been investigated.
- The pests appear to remain present after investigation.
- The pests have left harmful metabolic substances or other residue.
- The pest damage hampers the opening and closing of the book.
- The book cannot be consulted without the risk of material loss or new damage.

MODERATE



22.4

Damage caused by woodworm to a wooden cover with leather covering material



SERIOUS



22.5

Attack on a paper book block by silverfish



GLOSSARY

ACIDIFICATION

Acidification of paper by internal factors (such as raw materials) or by external influences (such as the environment). This weakens the internal structure of the paper.

ALUM-ROSIN SIZING

Technique for the production of paper used since the beginning of the nineteenth century. The high acidity of the resin results in a relatively swift acidification of the paper.

ALUM TAWED SKIN (LEATHER)

Leather prepared by means of tawing with alum. The colour is white or pale yellow to grey.

ANIMAL BASED GLUE (OR HOT GLUE)

Collagen-based adhesive, an adhesive-forming protein that is an important part of animal tissue. It is obtained by heating skin and bones in watery fluids.

BANDS

Transversally placed element integrated into the sewing, which often forms the connection between text block and cover.

(CARD)BOARD

Material with a composition similar to paper but with a greater thickness and stiffness. (Card)board often has a layered structure.

BOARD

Material that imparts stiffness to the covers of a binding.

BOOK BLOCK

Folded leaves ordered in gatherings or assembly of loose leaves, including attached or inserted elements, which are all joined by means of stitching, staples or glue.

CELLULOSE

Long organic molecules extracted from the cell wall and the woody parts of plants. It is the principal raw material for paper and (card) board.

COPPER CORROSION (OR GREEN CORROSION)

Damage caused by copper-containing pigments in green or blue ink. The ink becomes visible on the back of the sheet and eventually even burns through the paper.

COVERING MATERIAL

Supple material with which the spine and covers are wrapped, either entirely or partially. When there are no stiff boards and the covers are supple, the covering is called wrapper.

COVERS

Flat, more or less rigid surfaces that are attached to the front and back of a book block and which hinge along the spine thus protecting the book block.

DUST-JACKET

Separate wrapper of supple material, usually paper, folded around a book for extra protection and usually showing some decoration.

EDGE OF THE BOOK BLOCK

Side of the book block where it has been cut, usually cut flush. Normally, a book has three edges: the head (top), the tail (bottom) and the front edge (opposite the spine).

END BAND

Structure at head and tail of the book block for decoration or as reinforcement. One can distinguish the head band from the tail band.

END LEAVES

One or more leaves of paper or other flexible material added to the book block, the outer one of which is usually pasted to the inside of a cover, and is called pastedown, whereas the other, free leaves are called flyleaves.

ENDCAP

Edge of the spine covering, over head and tail of the book block. One can distinguish the headcap from the tail cap.

FASTENINGS

Mechanism to keep a book closed, such as ties and clasps.

FELTING

Specific damage whereby the internal structure of the paper is attacked resulting in loss of stiffness. This kind of felting is caused by the influence of moisture, mould or varying climatic conditions on both glue and cellulose fibres.

FLUORESCENCE

Phenomenon where an object under the influence of light begins to emit light itself (of a different colour). Moulds and ink corrosion will emit light in various shades under UV light.

FOXING

Speckles, usually light brown to black, which can be found all over a sheet of paper.

FURNITURE

Elements made of metal or another hard material which are attached to the binding, such as bosses, centre and corner pieces, elongated fittings along the edges of the covers, and chains. Clasps (or components of them) are not considered as furniture.

GALL NUT EXTRACT

Extraction of gall nuts, which together with iron sulphate is the main ingredient of iron gall ink. Gall nuts are outgrowths of plant leaves caused by insects burying their eggs in the leaf.

GATHERING

One or more folded sheets put into each other in such a way that there is one single spine fold (or gathering fold) through which this assembly can be sewn.

GRAIN

Surface structure of the hair side of leather, characterised by natural irregularities.

HAND FOLD NUMBER

Test method for measuring the strength of paper, wherein a corner with a three centimetre fold length is folded several times. The brittleness of the paper is indicated by the number of times the corner can be folded before it breaks.

HINGE (INSIDE) /JOINT (OUTSIDE)

Composition of elements that connect the covers to the book block and make it possible for them to hinge. The outer part of this mechanism is called joint and the inner hinge.

INK CORROSION

Damage caused by the acidic properties of iron gall ink. The lines or letters eat slowly through the paper and can eventually even become detached from the body of the paper.

INTRINSIC DECAY

Ongoing degradation process, even when an item is stored under good climatic conditions.

IRON SULPHATE

Iron salt that together with gall nut extract is the main ingredient of iron gall ink.

LEAF

Piece of thin and flexible material, usually paper but also vellum and sometimes fabric, almost always rectangular en normally in the size of the book block of which it forms a part.

LEATHER

Animal skin made resistant to decay by tanning. During preparatory treatment, the structure of the skin fibres remains unchanged, thus retaining properties such as flexibility, thickness and opacity. To be distinguished from alum tawed skin.

LIGNIN

Chemical substance that occurs in the cell wall of certain plants. Lignin is one of the causes of acidification of paper that is made from wood pulp.

LUMBECKING

A form of binding where the spine side of the book block is cut flush and the loose sheets are glued or pasted to each other.

MECHANICAL ADHESION

Torn and frayed parts of an object which have become stuck together.

MECHANICAL DAMAGE

Tearing, folding or missing parts (gaps) due to use, improper storage or misfortune.

OXIDATION

Chemical process in which a compound is formed with oxygen. Organic substances such as paper, leather and parchment degrade via this process. Oxidation is accelerated by heat, water and air.

PAPER

Thin and supple layer of material consisting mainly of felted plant fibers. Paper is formed by draining a suspension of paper fibres on a sieve.

PARCHMENT

Animal skin made resistant to decay. The treatment changes the structure of the skin fibres and gives the parchment its characteristic properties: a minimal thickness, a degree of transparency and a light colour.

PH VALUE

Level of acidity, ranging from 1 (high) to 14 (low). We consider a value of 7 as pH neutral.

RED ROT

Form of damage to leather covers often associated with red discolouration. The leather degrades and loses its internal structure. It often pulverizes.

SEWING

Assembly of threads that connect the gathering on the spine, resulting in a book block.

SOFTENERS

Substances which make synthetic materials elastic. Softeners are gradually released from the material into which they have been worked.

SPINE

Part of the book block where the sheets are connected.

SPINE INLAY

Thin piece of (card)board stuck on the inside of the spine covering and not attached to the spine of the book block, as is the case with a ‘hollow back’.

SPINE LINING

Piece of flexible material (such as paper, fabric and vellum), often consisting of different pieces, that imparts a certain degree of rigidity to the spine, sewn or pasted under the spine covering. It strengthens the connection between book block and cover.

SWAB

Surface examination for the presence of active moulds. A sample is taken from the surface with a sterile cotton swab and then deposited on a suitable culture surface for several days after which the activity can be evaluated.

TACKET

A twisted strip of parchment or leather, or a piece of cord, the ends of which are closely wound around each other and thereby fastened; the tacket is used to attach the spine of a wrapper or binding to the sewing structure or to form the sewing structure.

TURN-IN

Parts of the covering material that are folded over the edges of the boards and cover the adjacent parts of the inside.

WASTE SHEET

Wide strip of parchment or paper sewn with the outer end-paper gathering.

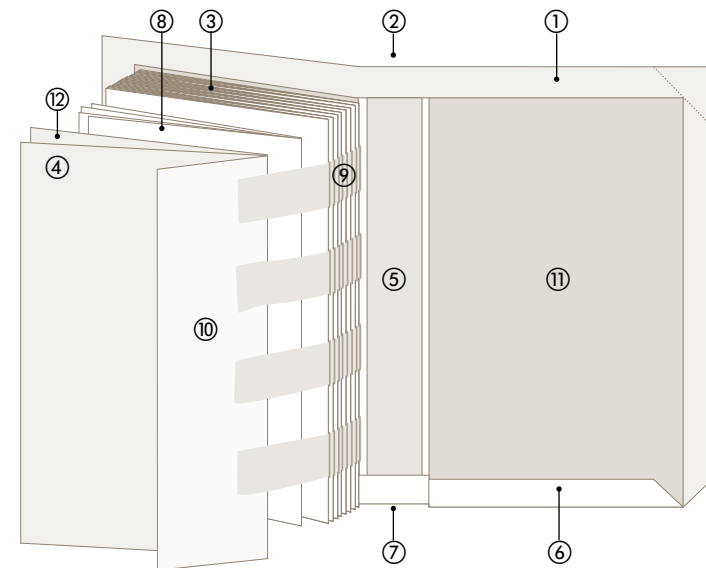
WOOD GRIND (OR WOOD PULP)

Raw material for paper in the period after 1840. Wood grind contains lignin and if it is not removed from the paper pulp, the paper can acidify.

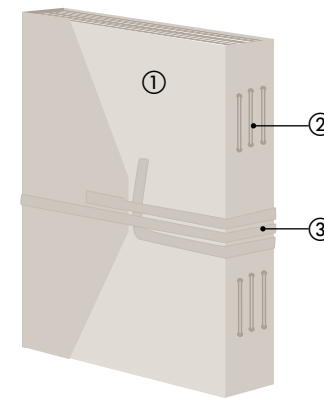
WRAPPER

Piece of flexible material (no boards) forming the binding of a book.

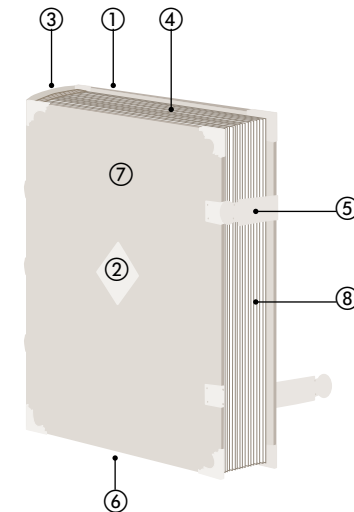
COMPONENTS OF A BOOK



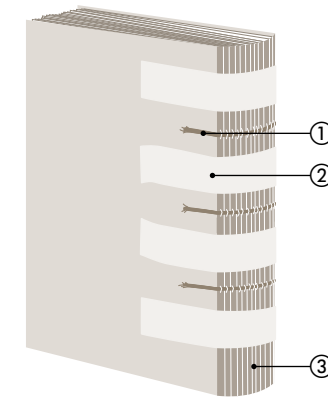
- I
- | | |
|------------------------|-----------------------|
| 1 Covering material | 8 Gathering |
| 2 Bookbinding | 9 Sewing structure |
| 3 Book block | 10 Waste sheet |
| 4 Pastedown (end leaf) | 11 Board |
| 5 Spine inlay | 12 Flyleaf (end leaf) |
| 6 Turn-in | |
| 7 Endcap | |



- II
- | |
|------------------------|
| 1 Wrapper |
| 2 Tacket |
| 3 Long strap fastening |



- III
- | |
|---------------------|
| 1 Backboard |
| 2 Furniture |
| 3 End band |
| 4 Top edge |
| 5 Clasp (fastening) |
| 6 Tail edge |
| 7 Front board |
| 8 Front edge |



- IV
- | |
|----------------|
| 1 Band |
| 2 Spine lining |
| 3 Spine |

COLOPHON

Author

Marijn de Valk

Editors

Sam Capiu

Erik van der Doe

Hilde Schalkx

Final editing

David Coppoolse

Susanna De Schepper

Photography

Ivo Wennekes

Diagrams

Liesbeth Labeur

Coordination

Eva Wuyts

Design

**Studio Marise Knechtmans,
Amsterdam**

Translation

Valerie Carroll-Willmott

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The background of the entire image is a close-up, vertical view of several old, thick book spines. The spines are made of dark, weathered wood, showing significant grain and some surface damage. The edges of the pages are visible, appearing aged and slightly discolored. A solid red rectangular box is overlaid on the left side of the image, containing white text.

The *Library Damage Atlas* is a tool used in recognising and classifying damage in library collections according to the UPLA-method. The atlas provides insight into the different types of damage and their causes and may serve as a starting point for the development of a conservation and management plan.