

A TRIBUTE TO A VISIONARY

MORGAGNI



A CLEARER VISION OF SIMPLICITY

M 268



PHILIPS

MORGAGNI SIMPLY EVERYTHING



Giovanni Battista Morgagni (1682 – 1771) was born at Forlì in Italy. Trained in medicine at the University of Bologna he became Professor of Practical Medicine at Padua in 1711 and later Professor of Anatomy.

His professional life was devoted to practising of medicine and the study of normal and pathological anatomy by the post mortem dissection of patients whose disease he had often followed during their lives. At the age of 79 he published the standard work in pathology describing the results of a whole life of scientific research. To pay tribute to the remarkable contribution in the fields of anatomy and pathology, our newest microscope bears his name.

MORGAGNI – SIMPLY EVERYTHING

Since becoming commercially available, about 50 years ago, the transmission electron microscope (TEM) has had an enormous impact on our understanding of living cells.

With TEM it appeared possible to elucidate most of the anatomy and morphology of plant and animal cells and tissues. Moreover, TEM contributed significantly in finding answers on fundamental questions about ongoing physiological and pathological processes.

This millennium marks a new scientific era for FEI Electron Optics and sets the stage for the introduction of the "Morgagni", a state-of-the-art microscope that offers remarkable ease-of-use and meets with the demands of modern scientific users. Designed to run under the Windows 2000 operating system, the Morgagni is powerful, secure and reliable. It is an instrument that offers great value to the demanding scientific areas of cell biological research and diagnostic screening as well as being very suitable for pharmaceutical industrial applications.



Setting a new standard for high image quality, the Morgagni offers fast and easy digital image acquisition and analysis using fully embedded CCD camera control.

For an excellent price-performance ratio Morgagni offers: Simply Everything.

MORGAGNI MEETS THESE REQUIREMENTS BECAUSE:

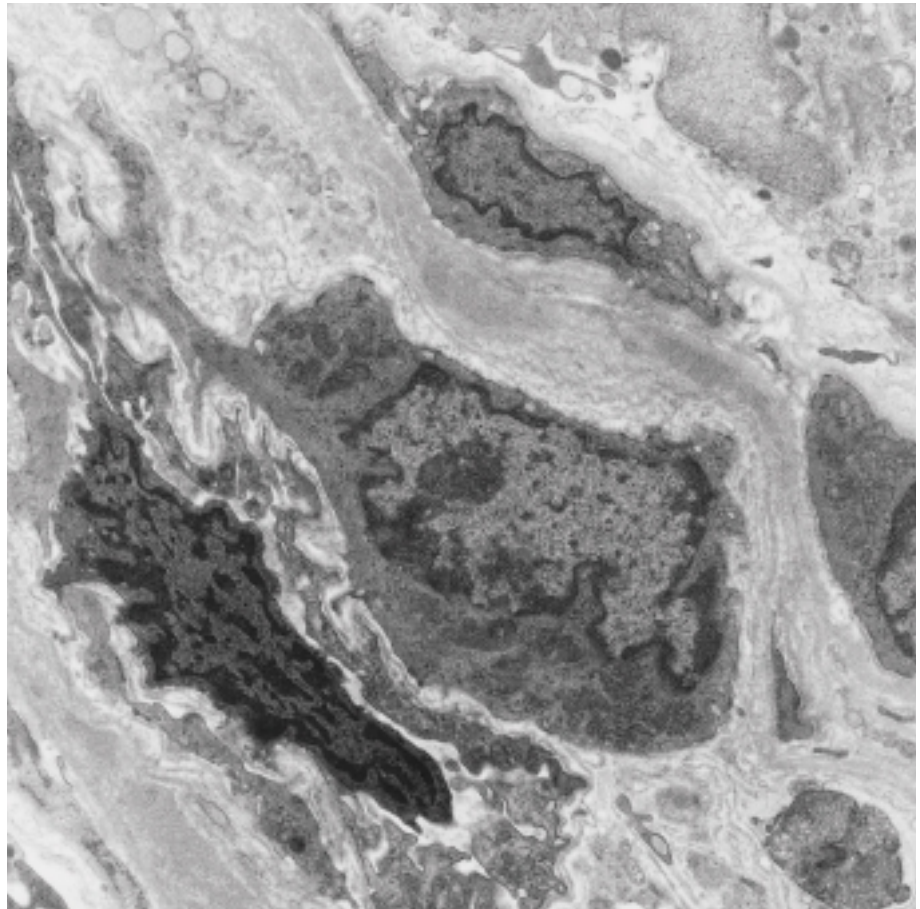
- It is designed with focus on the university, industrial and medical scientific environment.
- It combines the latest computer software technology with Philips' well-proven engineering design concepts.



MORGAGNE



DIAGNOSTIC SCREENING



*Kidney tissue with nephritis.
Sample courtesy of Medical School,
University of Pretoria, South Africa.*

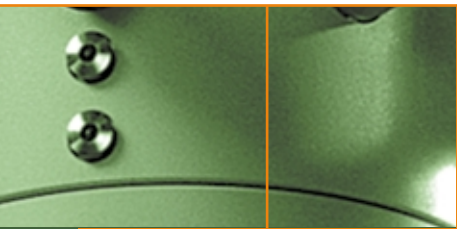


“EXPAND YOUR RESEARCH CAPABILITIES AND ABILITY TO UNDERSTAND CELLULAR AND SUBCELLULAR STRUCTURES AND PROCESSES THAT EFFECT OUR LIVING WORLD”

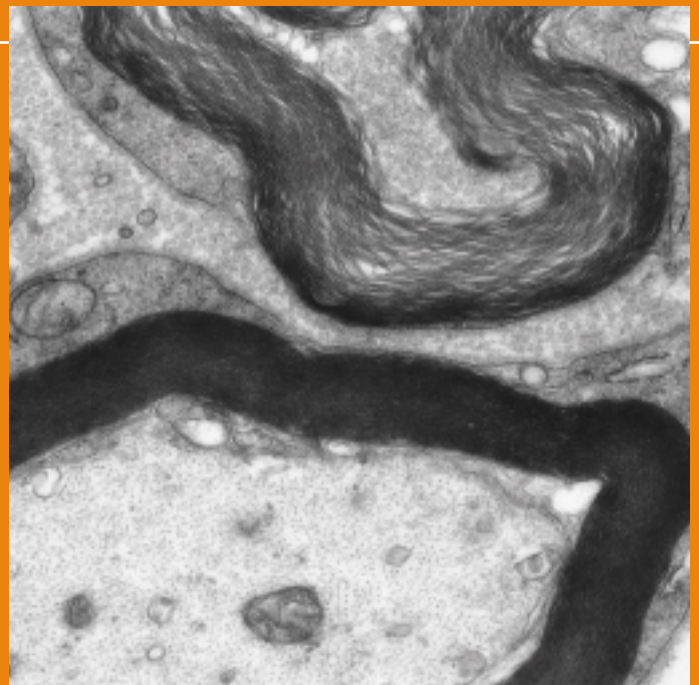


As a consequence of a growing and ageing world population, the number of patients in hospitals inevitably increases. This stresses the urgency for a reliable screening of disease patterns at a simultaneously high speed.

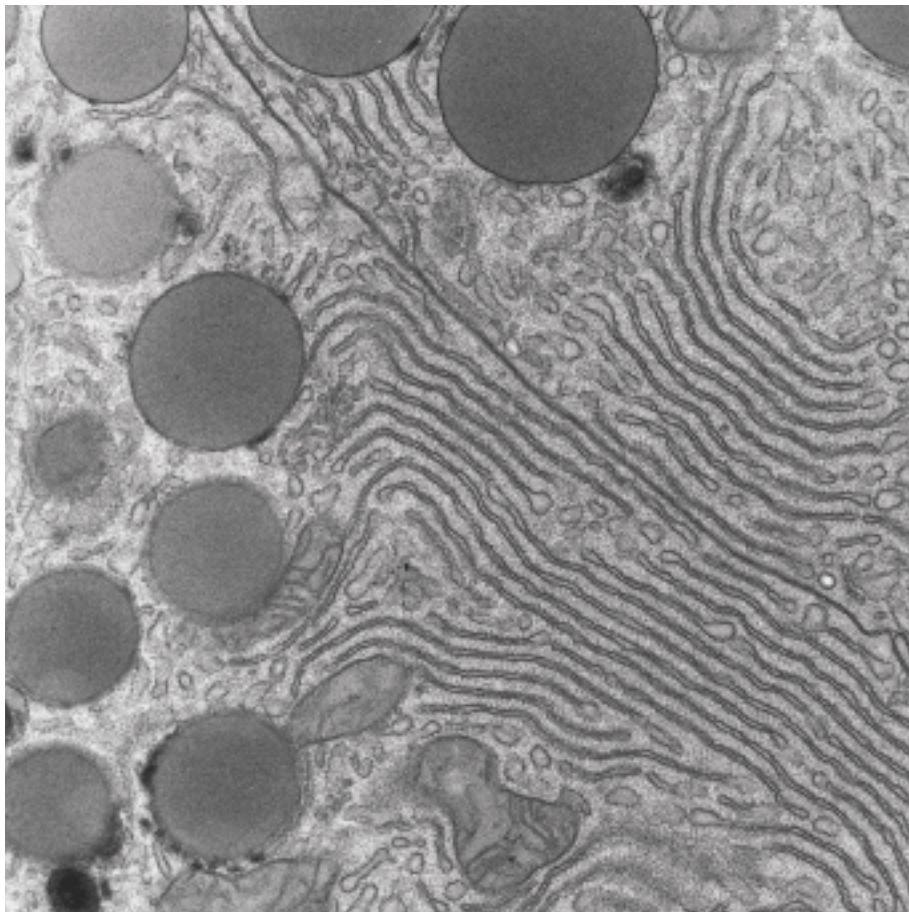
As a mainstream diagnostic modality in medical centers, the Morgagni is a “ready to use” system that ensures high sample throughput to cope with the need for an increasing speed of diagnostics. Furthermore, the completely digitized Morgagni allows on-line consultancy with colleagues and experts in the field to facilitate a fast and correct diagnosis.



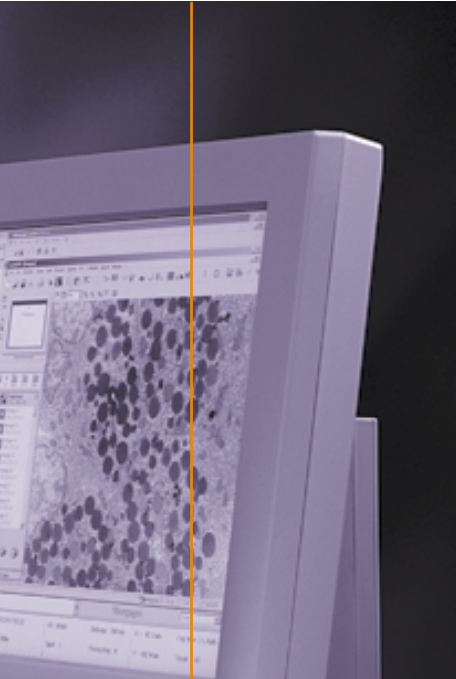
*Healthy (bottom)
and degenerating (top)
nerves in human skin.*



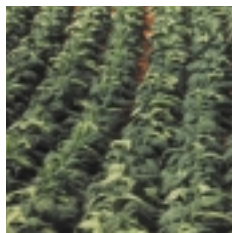
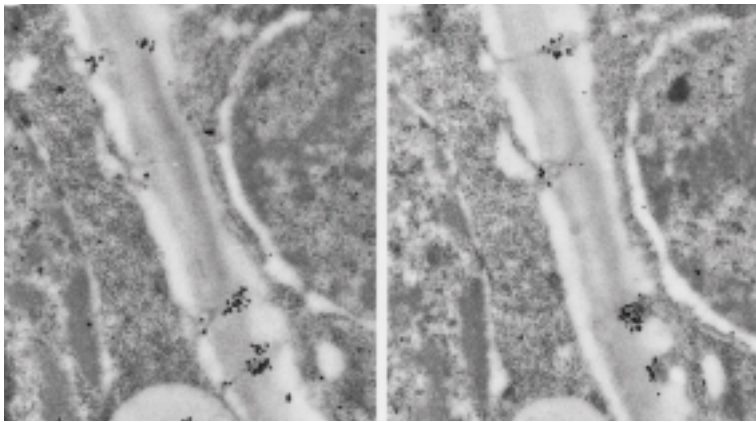
CELL BIOLOGY



*Studying the dynamics of the
Endoplasmatic Reticulum.
Sample courtesy of Dr. Luff,
Monash University, Australia.*



Immuno cytochemistry in transgenic tobacco plants.



Achieving breakthroughs that can improve our understanding of processes that affect our living world requires research into the underlying fundamental processes. For studying ongoing physiological and pathological pathways, Morgagni is perfectly suited. For retrieval of cell biological data the Morgagni is set for fast and easy high quality image acquisition and analysis. Its "ease-of-use" makes Morgagni very attractive for multi-user scientific environments like universities and institutes.

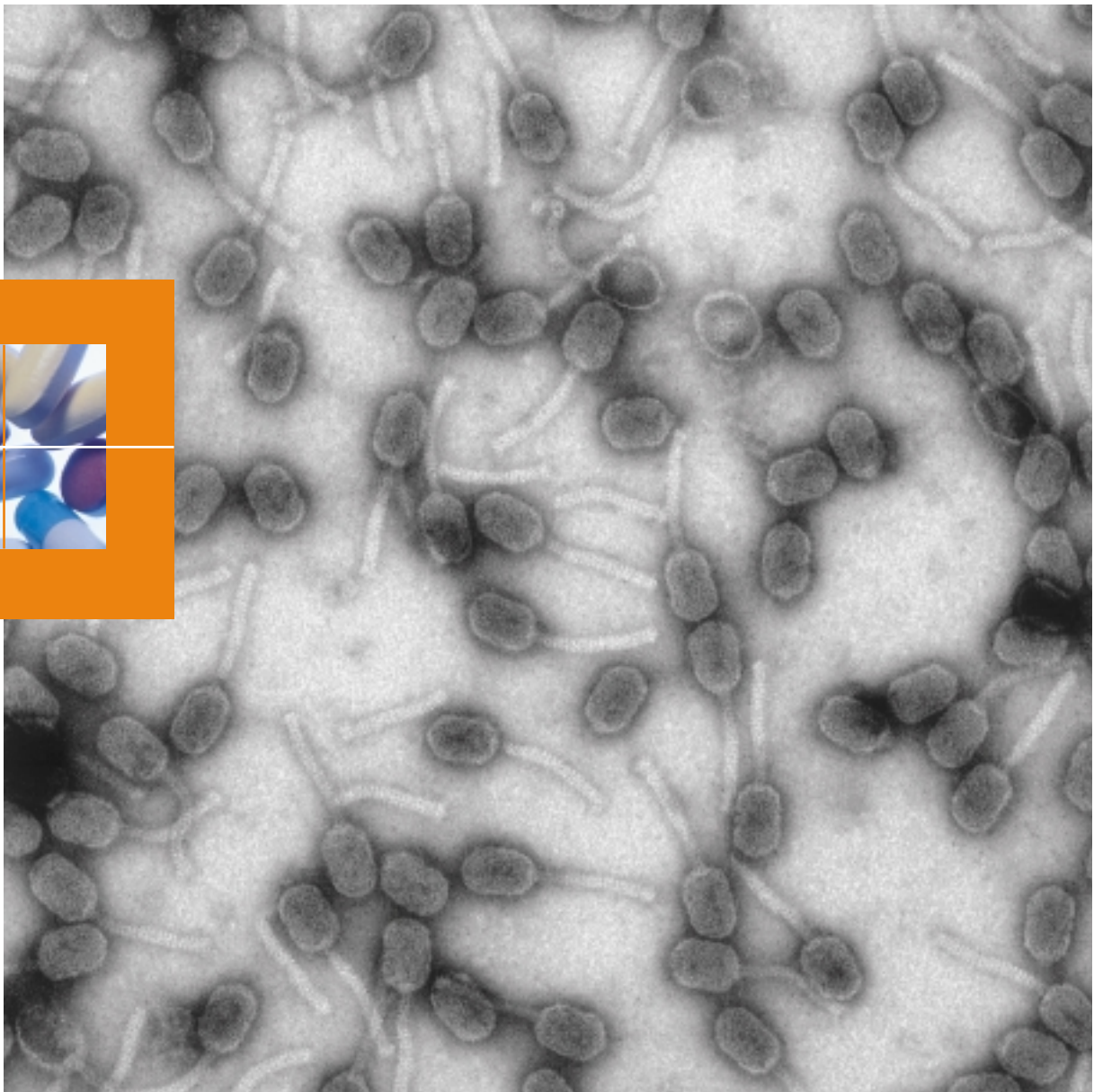


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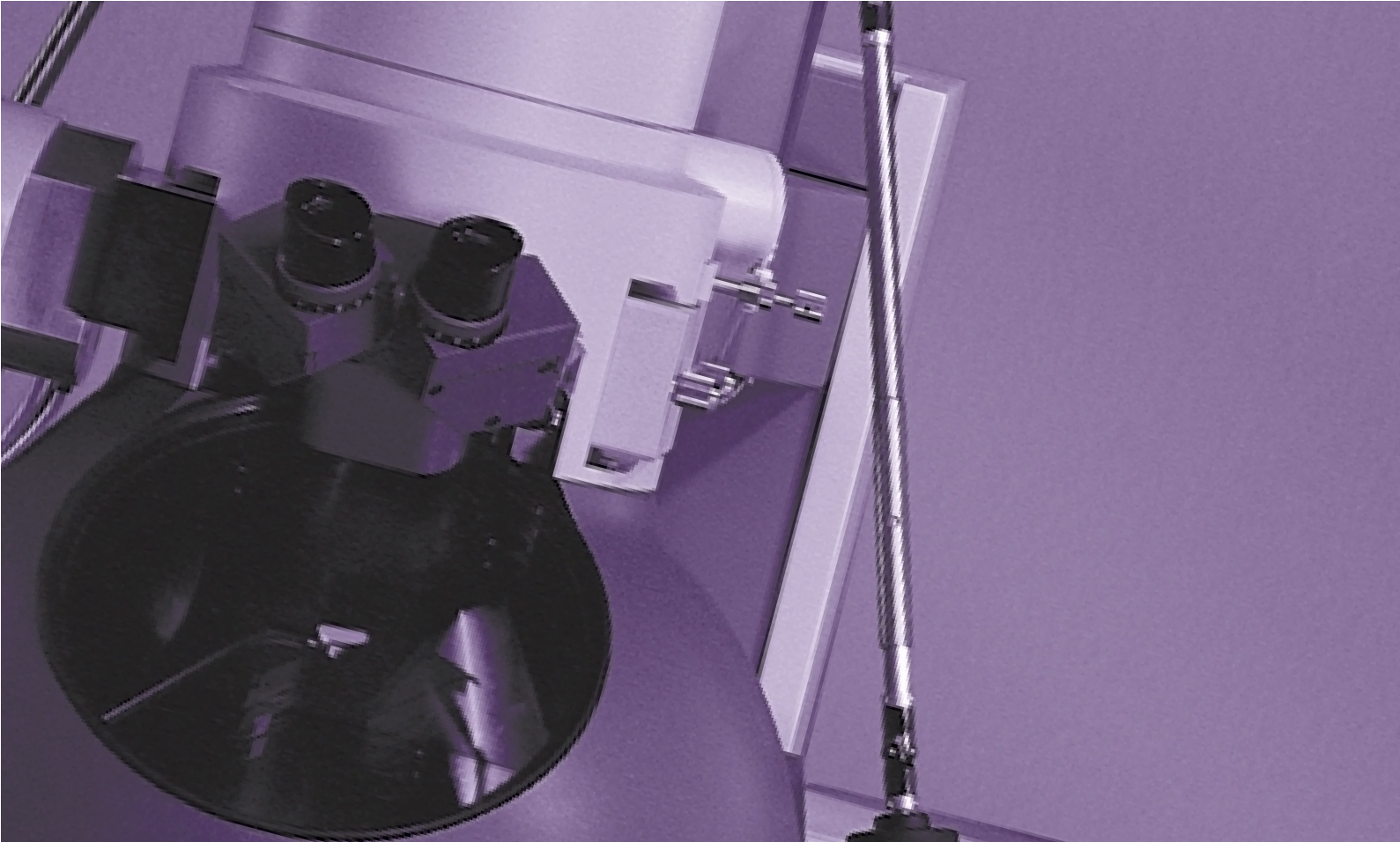
PHARMACEUTICALS

Morgagni is an effective and efficient tool to gain insight into release mechanisms of drugs in the body. In addition, the effects of medicines on the morphology and functioning of tissues and organs needs to be investigated.

The Morgagni, with its fast and high quality information acquisition, can play an essential role in this and is of significant importance for continuing advances in healthcare.



Bacteriophages: an alternative for antibiotics?



WORKING FOR YOU AND WITH YOU

A transmission electron microscope is a highly advanced and versatile instrument. It can also be very demanding and therefore needlessly complicated. We have accepted the challenge to design a microscope which meets all the demands of the user but is still easy to operate. The Morgagni ensures that occasional and regular users can obtain the highest quality images without going through unnecessarily complicated procedures. Microscope conditions, including specimen positions can be programmed for automatic retrieval and exposure. In fact, once the Morgagni is set, your microscope session can be completed almost fully automatic.

Using the newly composed and software controlled Morgagni User Interface, microscopy is now easier than ever.

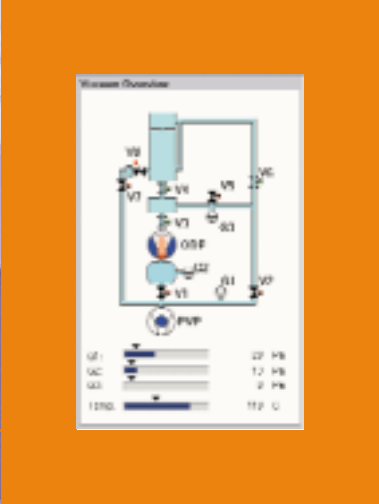
The Morgagni User Interface consists of six, fixed set-up pages, which are defined according to specified functionalities (Vacuum, High Tension, Column, Stage, Camera, Alignment).

At the bottom of the screen we find the status bar. Here the basic information on the microscope status is displayed e.g. the Magnification, High Tension, Stage Position and Exposure Time.

In the event you need help, the on-line help manual in the User Interface is permanently at your service.



All functions can be customized to accommodate different levels of user-experience. A high user-expertise means more responsibility and accessibility to the more vital systems of the microscope. Using this concept, only the supervisor has e.g. the right to ventilate the Gun and Column while he/she can selectively add or remove the camera ventilation button in the User Interface of the underlying user level. To enhance control of the Morgagni, we have added a vacuum overview page in which the status of vacuum is displayed in colours in addition to the classical read-out units. Moreover, the status of the rotary and diffusion pumping system (RP, DP) can be easily observed.



Increased computerisation of third party peripherals (TV and CCD cameras) has led to the proliferation of different computers and software programs. In the Morgagni, the control of digital image acquisition has been embedded into the User Interface of the microscope. By embedding, part of the functionality of third party software is taken over by microscope control which makes digital image acquisition faster and simpler.





"LOOKING BEYOND THE DARKROOM

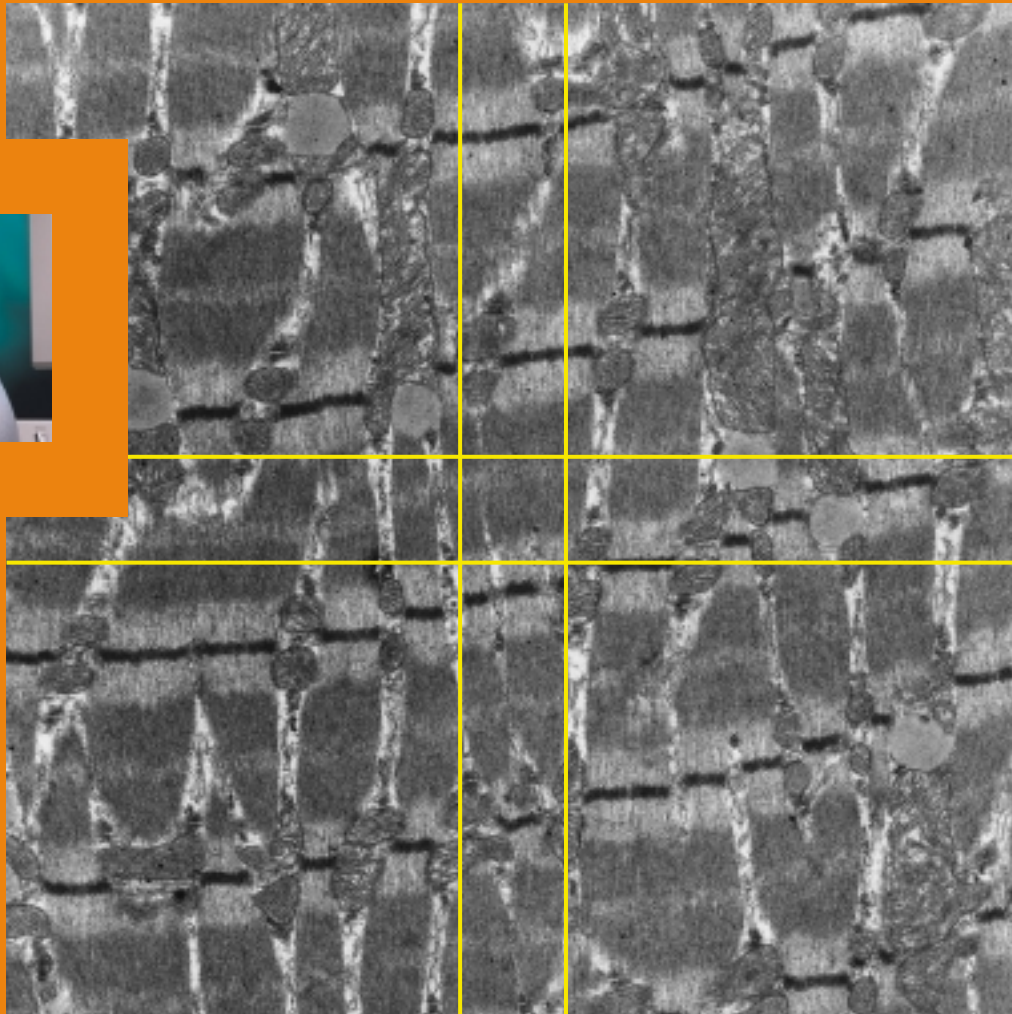
"...TO HIGH QUALITY DIGITAL IMAGING."

As one of the world's leading and most respected manufacturers of electron microscopes, we are renowned for outstanding image quality of electron micrographs. The Morgagni with its high power objective lens does further justice to our reputation. As the magnification system of the Morgagni is programmed to focus both energy loss electrons and no-loss electrons at the same point, sharp high-contrast images are ensured –even for semi-thin sections. User selectable automatic contrast enhancement (ACE) and a wobbler-focus adjustable in direction and amplitude guarantee an optimal image quality.



The CCD camera is now the ideal alternative to “wet” photography and continues to gain importance within virtually all TEM applications. Quality standards that, until now, have been set in the darkroom are quickly being surpassed by high quality digital images: made possible by an increased pixel resolution of the cameras and the print quality of dye sublimation printers. Moreover, the digital imaging software of the Morgagni gives users the ability to efficiently enhance image quality while advanced digital technologies like multiple image alignment - or stitching - guarantee an equal image quality compared to “wet” photography for a lower price.

AGE... ”

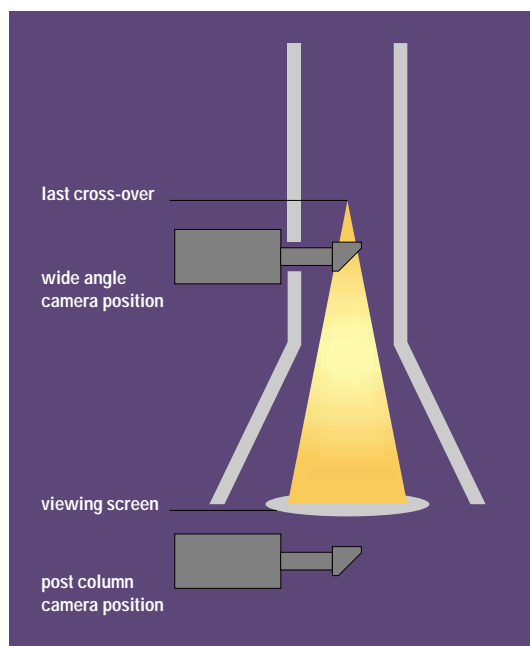


Stitched digital image of muscle tissue, composed out of 4 1k x 1k images.



SPEED OF ACQUISITION

The Morgagni offers the possibility to use one and the same digital camera for both wide angle (plate camera size) and high resolution performance (post-column position). The digital camera can easily be moved from one position to the other.



Beyond high quality imaging, the Morgagni makes digital image acquisition a fast and easy process. Acquired data are easy to archive in modern storage media, can be transferred into reports or directly sent to colleagues all over the world via the internet. On top of everything, digital imaging offers optimal cost effectiveness by eliminating the need for photographic paper and darkroom chemicals – both of which pose a constant threat to our environment.

AND ONLINE INFORMATION SHARING



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Online information sharing via the internet.

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STANDARD FEATURES MORGAGNI



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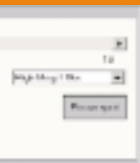
M 268





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DOUBLE SPEED MANUAL SPECIMEN MOVEMENT **1**

The Morgagni has two manual driven specimen rods. One design for screening the specimen with high speed and another for accurate displacement of the sample at high magnifications.

SPECIMEN RELOCATION SYSTEM **2**

The specimen stage contains motor drives for specimen relocation. An infinite number of positions (depending on the PC memory), can be stored and recalled with this system.

COMPUTER, LCD MONITOR AND KEYBOARD **3**

The microscope is fully controlled by a Dual Pentium PC using Windows 2000 as the main operating system. Digital image acquisition (requires CCD camera) and microscope control occurs through the Morgagni User Interface and integrated image analysis software which is visualised via a 17" video colour monitor or 18" LCD colour monitor. For ergonomic reasons, the keyboard is placed on a retractable desktop table, easy accessible for the microscope operator.

SOFTWARE UPDATES

Regular software updates and upgrades keep the Morgagni in line with the latest technological and application modifications. In this way, the instrument's state of the art lifetime is significantly extended.

MEASURING

On line measuring of feature distances in specimens is feasible through the direct measuring function on the motorstage.

PLATE CAMERA **4**

The Morgagni is equipped with a plate camera allowing up to 56 sheet films to be loaded in a single operation. There is a choice between 60 x 90 mm and 3.25 x 4 inch film.

An automatic exposure function enables full automation of negatives to be taken.

AUTOMATED EXPOSURE SEQUENCE

X-Y coordinates, magnifications, focus and illumination can be selected in advance of the automatic exposure sequence. Upon pressing the exposure button the microscope will move the motor stage to the correct position, change magnification, illumination and focus and make an exposure. This sequence will be repeated until all the pre-selected positions have been photographed.

USER INFORMATION ON NEGATIVE

The microscope will display on the negative the exposure number, magnification, μ -marker and date. Also 4 lines of 24 characters each are available to add additional text to describe the specimen.

DIGITAL CAMERA **5**

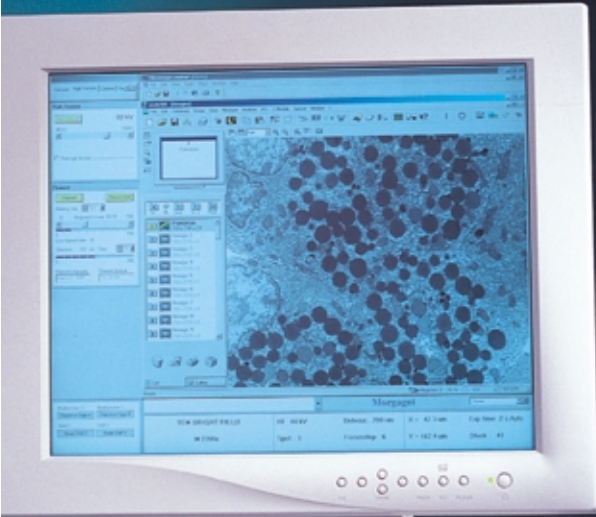
The Morgagni offers the possibility to use one and the same camera for both wide angle and post column position. The CCD camera can easily be moved from one position to the other.

SPECIMEN INJECTOR **6**

Rod with 5 interchangeable specimen tips. The specimen holder of the Morgagni is a single injector rod with an interchangeable tip. This unique multi-tip construction allows multiple specimens to be prepared in advance and exchanged on the injector in rapid succession.

COLD TRAP (OPTION)

Designed for demanding applications, the cold trap improves vacuum conditions around the specimen area.



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SPECIFICATIONS MORGAGNI

ELECTRON SOURCE

High Voltage range: 40 to 100 kV in steps of 10 kV
High tension conditioning up to 105 kV.

BEAM CURRENT

Up to 170 μ A

EMITTER

Tungsten

ILLUMINATION SYSTEM

Two illumination lenses, Condensor 1 and 2

APERTURES

Aperture holder for 3 condensor apertures with click-stop mechanism for aperture selection

ILLUMINATION CONTROL

User selectable automatic INTENSITY LIMIT to prevent electron beam intensity overload on the specimen. User selectable INTENSITY ZOOM links the illumination control to the image magnification in order to maintain a constant screen brightness during magnification changes.

IMAGING SYSTEM

Three imaging lenses: Objective, intermediate, projection.
Aperture holder for three objective apertures with click-stop mechanism for aperture selection.
Wobbler focussing aid continuously adjustable in amplitude and wobbler direction. Auto objective lens preset.

INSTRUMENT CONTROL

The microscope is fully controlled by an integrated Dual Pentium PC using Windows 2000 as the main operating system. Various alignments and operation parameters are stored in the non-volatile computer memory. A single knob controls magnification in all TEM operation modes. Similarly, a single knob controls focussing in TEM and diffraction.

OBJECTIVE LENS

F = 1.6 mm / Cs = 1.6 mm / Cc = 1.5 mm
TEM point resolution 0.45 nm
TEM line resolution 0.34 nm
Minimum probe size 0.50 μ m
Smallest focus step 5.0 nm
Specimen tilt +/- 6°

MAGNIFICATION AND CAMERA LENGTH

Image M 268:		Image 268 D:	
Full range	25-200000 x	Full range	35-280000 x
Low mag	25-800 x	Low mag	35-1100 x
High mag	1000-200000 x	High mag	1400-280000 x
Camera length 100, 200, 400 mm			

SPECIMEN HOLDER

The specimen holder is a single injector rod with 5 exchangeable tips for fast specimen change.

MOTORSTAGE

The standard motorstage can store XY coordinates for rapid retrieval of interesting stored specimen positions. Special exposure select function for fast examination of stored specimen positions and full automation of the exposure sequence.

MANUAL DRIVES

The manual controls are a double speed low-resistance drive. Fast movement of the specimen for searching at low magnifications, slow and precise movement for high magnifications.

TEM VIEWING

Main screen is 160 mm diameter, separate small phosphor screen for focussing in conjunction with the binoculars. Main viewing window 210 mm, side window of 145 mm diameter. Easily accessible due to the asymmetric positioning of the microscope column.
Magnification of binoculars is 12 x; exit pupil >4.5 mm.
Binoculars are equipped with removable eye caps for glass wearing users.

TEM RECORDING

Plate camera or 35 mm film camera or combined system, depending on the configuration. Plate camera: 56 flat films 3.25 x 4 inch or 65 x 90 mm. 35 mm camera: 40 exposures format 28 x 28 mm. Camera control fully electronic with automatic exposure timer or manual exposure control. Exposure sequence fully automatic. By pressing the exposure button the computer automatically stores the important parameters like magnification, size of scale and exposure in a file. For describing the specimen the keyboard can be used to add text. Text will be printed onto the the negative.

DIGITAL IMAGING

Alternatively or in addition to film, data can be acquired with a CCD camera. This camera can be mounted at a 35 mm port or post columnwise (exchangeable), while specific software controls the image acquisition and analysis.

ALIGNMENT

Computer controlled electromagnetic fine alignment in pre-programmed procedures or as direct functions. The built-in computer allows the microscopist to save and store alignments within seconds. The various users can store their own alignment for their specific applications.

VACUUM SYSTEM

The microscope is pumped by a Diffstak TM pumping assembly. The pre-vacuum includes a buffer tank eliminating the need for continuous operation of the pre-vacuum pump.

VACUUM LEVEL

Total pressure:

Working pressure: 5×10^{-3} Pa (5×10^{-5} Torr)

Ultimate pressure: $< 1 \times 10^{-3}$ Pa ($< 10^{-5}$ Torr)

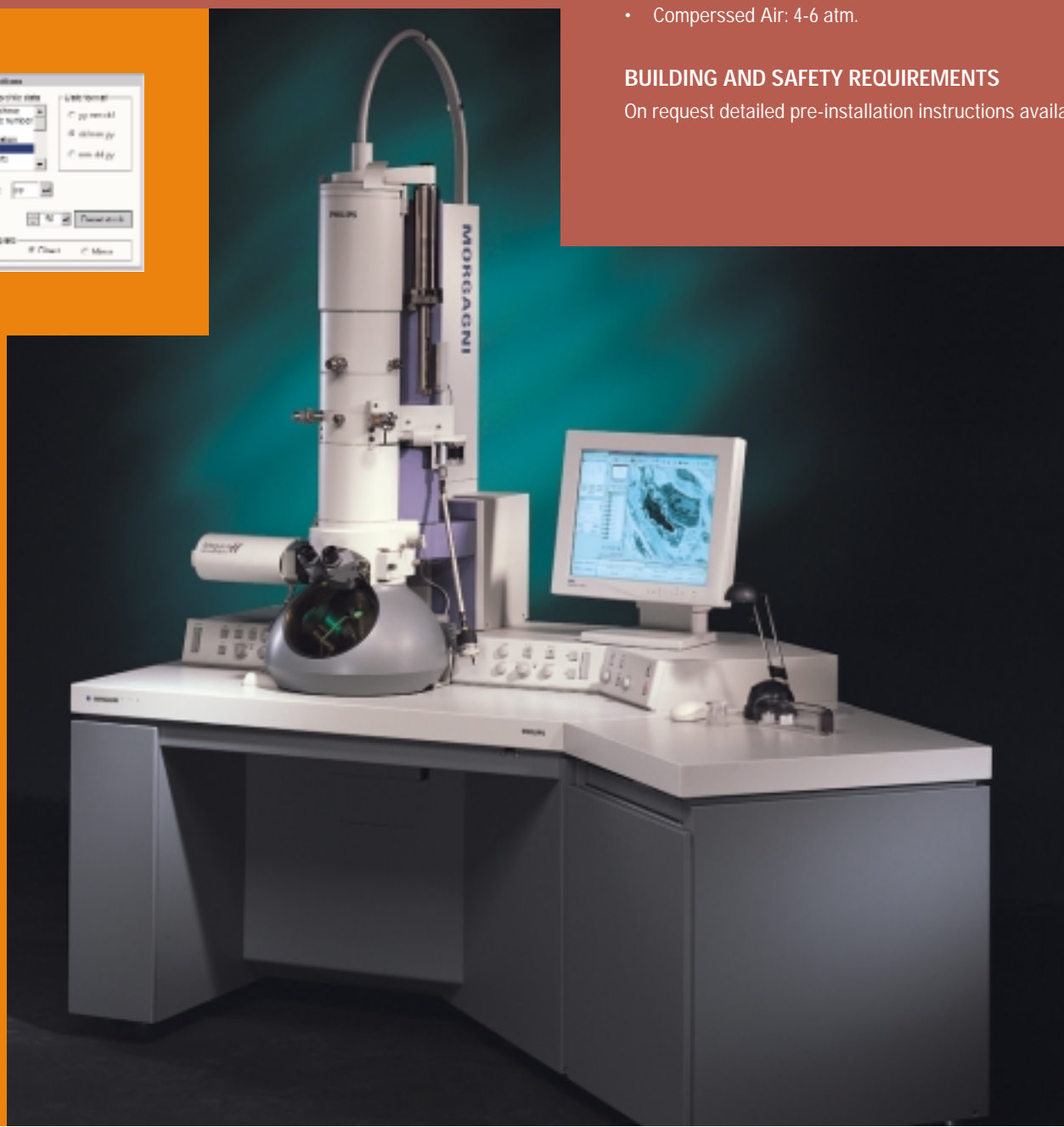
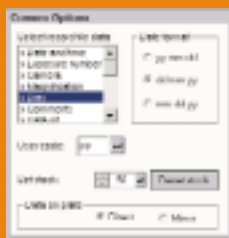
MICROSCOPE REQUIREMENTS

Space required:

- Minimum overall floor space: 2000 x 2500 mm
- Minimum ceiling height: 2550 mm
- Weight: 730 kg
- Cooling water: 0.2 – 0.6 Mpa
- Compressed Air: 4-6 atm.

BUILDING AND SAFETY REQUIREMENTS

On request detailed pre-installation instructions available





- Fully embedded digital imaging and film recording
- Easy and flexible instrument control
- Windows 2000 operating system
- Exchangeable CCD camera positions
- Best value-for-money

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