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**SINGER  
INSTRUMENTS**

A RESPONSIBILITY TO SCIENCE!



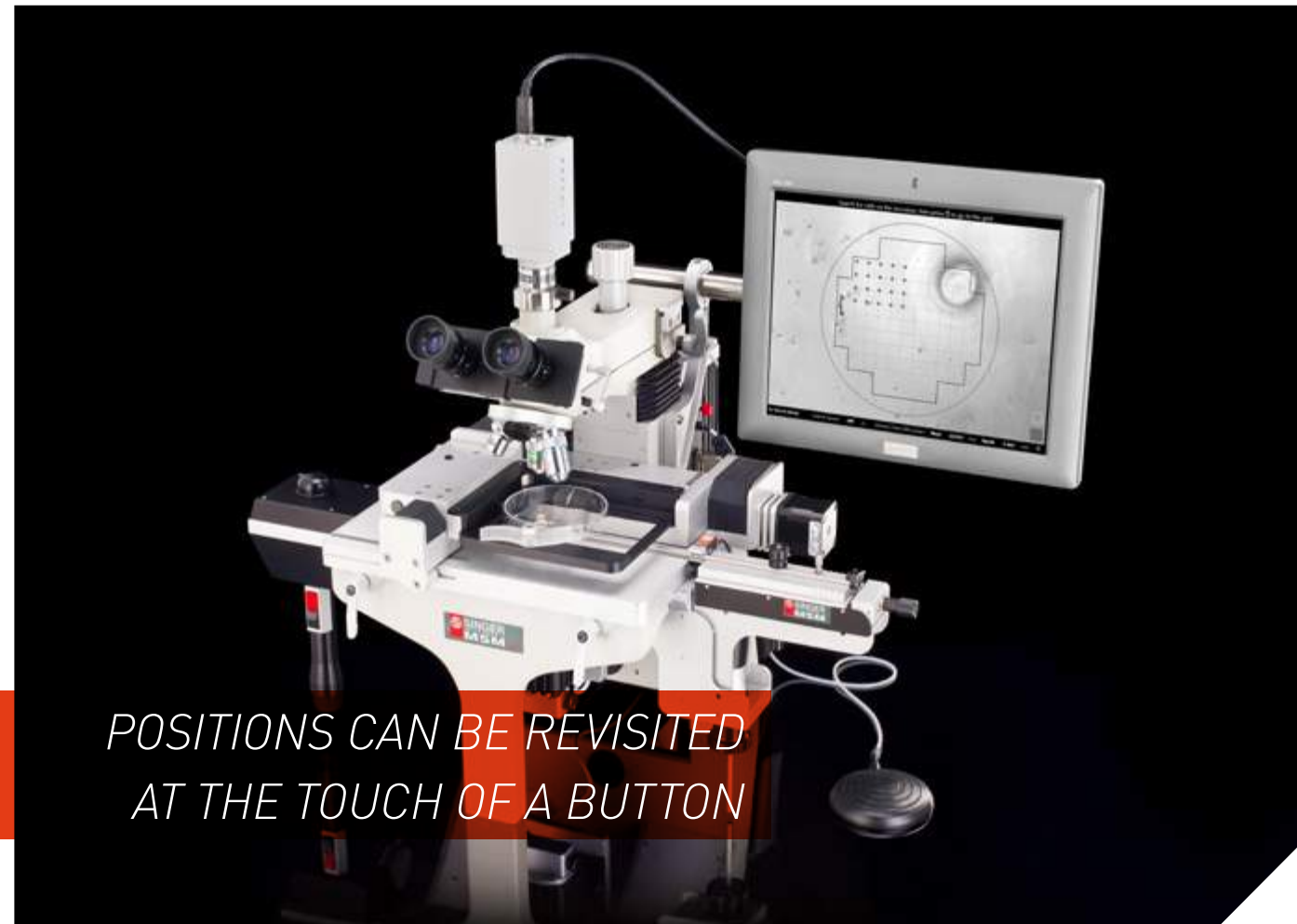
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*The worlds most powerful  
yeast tetrad dissection scope!*

COMPACT  
ULTRA-FAST  
INTUITIVE



Demystify the dark art of tetrad dissection before coffee break; teach your entire lab to do the same by lunch time! Singer Instruments have been helping people around the World achieve exactly this for the last 30 years by making this classical genetics technique as easy and fun as playing a video game!



#### WHAT IS IT?

The MSM 400 is a computer-controlled, motorised microscope platform for the dissection and documentation of yeast and fungal cells and spores; automating many of the repetitive aspects of these procedures. The small footprint means that there is room for an MSM 400 in every lab and multiple users can quickly perform, document and store their dissections, ageing studies and screens.

#### WHAT DOES IT DO?

The MSM 400 allows fast and easy dissection of tetrads and cells in a user-defined grid. The microscope automatically remembers the placement of cells and positions can be revisited at the touch of a button. Cells can also be photographed using the digital camera and built-in software.

*“THE MSM 400 REALLY  
HAS BEEN QUITE AN  
IMPORTANT AND USEFUL  
ADDITION TO OUR LAB!”*

· Sir Paul Nurse  
Francis Crick Institute  
UK



#### WHAT CAN I USE IT FOR?

- Ascospore dissection of *Saccharomyces cerevisiae*, *Schizosaccharomyces pombe* and other ascospore-producing species.
- Rapid point-visiting and documentation of cells in an orthogonal array.
- Image-capture, storage and export.
- Ageing protocols to study and record mother/daughter cell division.
- Screening protocols for documenting and revisiting cells/colonies of interest.

#### WHAT PLATES CAN I USE?

The MSM 400 accepts standard 90mm Petri dishes on which most tetrad dissections are performed. The MSM 400 also supports the use of rectangular SBS-dimension plates and glass slides with the slide-holder accessory\*.

#### HOW DOES IT WORK?

The specially developed motor-driven stage and purpose-designed, integrated micromanipulator are controlled with each hand in a comfortable position. Users can work 'head-down' using the binocular eyepieces or sit back and dissect from the video image on the screen! Both image paths are available simultaneously.

The MSM 400 boasts imaging and photography features to enhance ageing and screening protocols as well as tetrad dissection and includes a large touch-screen display fitted as standard. The microscope can be controlled via the integrated joystick, or by touch-screen control.





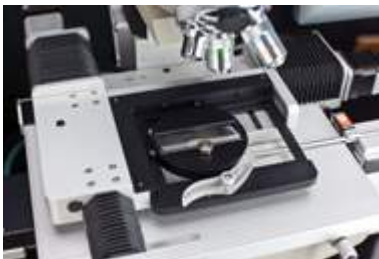
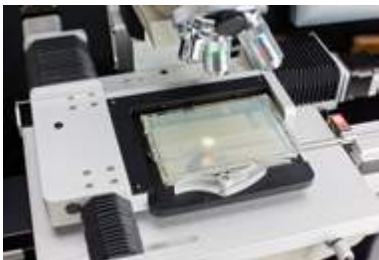
SIT BACK AND DISSECT FROM  
THE IMAGE ON SCREEN!

THE STAGE

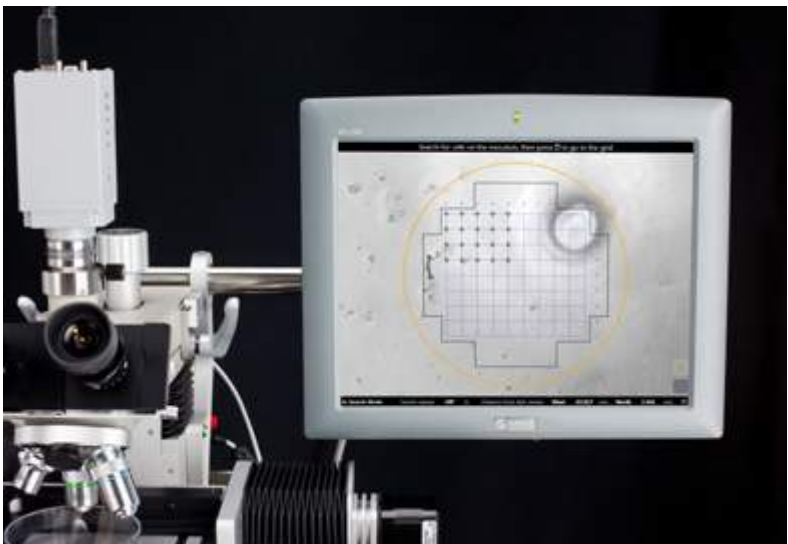
Our motor-driven stage supports 90mm Petri dishes, Singer PlusPlates™, standard rectangular SBS-format dishes and rectangular glass slides. The inverted petri dish holder reduces contamination and ensures accurate replacement of plates and dishes during sequential dissections or observations.

THE MICROSCOPE

The MSM 400 main unit is built to minimise vibration. The hinged trinocular head allows dishes and slides to be inserted and removed with ease and without fear of damaging optics and dissection needles. The trinocular head comes as standard to allow the easy fitting of a CMOS camera\*, invaluable for teaching and for techniques involving time-lapse image capture.



\*see accessories



THE TOUCH-SCREEN COMPUTER

The MSM 400 touch-screen computer has a full colour display with 32GB SSD storage, 4GB RAM and ultra-secure online upgrades and support. The user-interface is intuitive and very easy to use. The interactive display keeps the user informed of exact stage position and selected operating mode. Users can select and edit matrix size, inoculum search rate and other values. The automatic operating system handles stage movement for tetrad and ascospore location on the matrix. During normal operation, all functions of the MSM 400 can be controlled by just two buttons on the joystick. This level of control is enhanced by the touch-screen, which can be conveniently mounted to the rear top right or left of the microscope in portrait or landscape orientation. The touch-screen can be configured to display plate navigation information and control or camera output or both.

“THE SCREEN IS A LIFE  
SAVER AND REALLY  
HELPS SPEED UP THE  
TEACHING PROCESS.”

· Andrew Seeber  
Friedrich Miescher Institute  
Switzerland

CLICK TO SEE THE MSM 400 IN ACTION



THE CONTROL  
JOYSTICK

The comfortable joystick can control all the basic functionality of the MSM 400. For two modes of X and Y stage movement, two thumb-buttons and fingertip microscope focusing. The joystick and micromanipulator are located on opposite sides of the stage and can quickly and easily be configured for right or left-handed users.



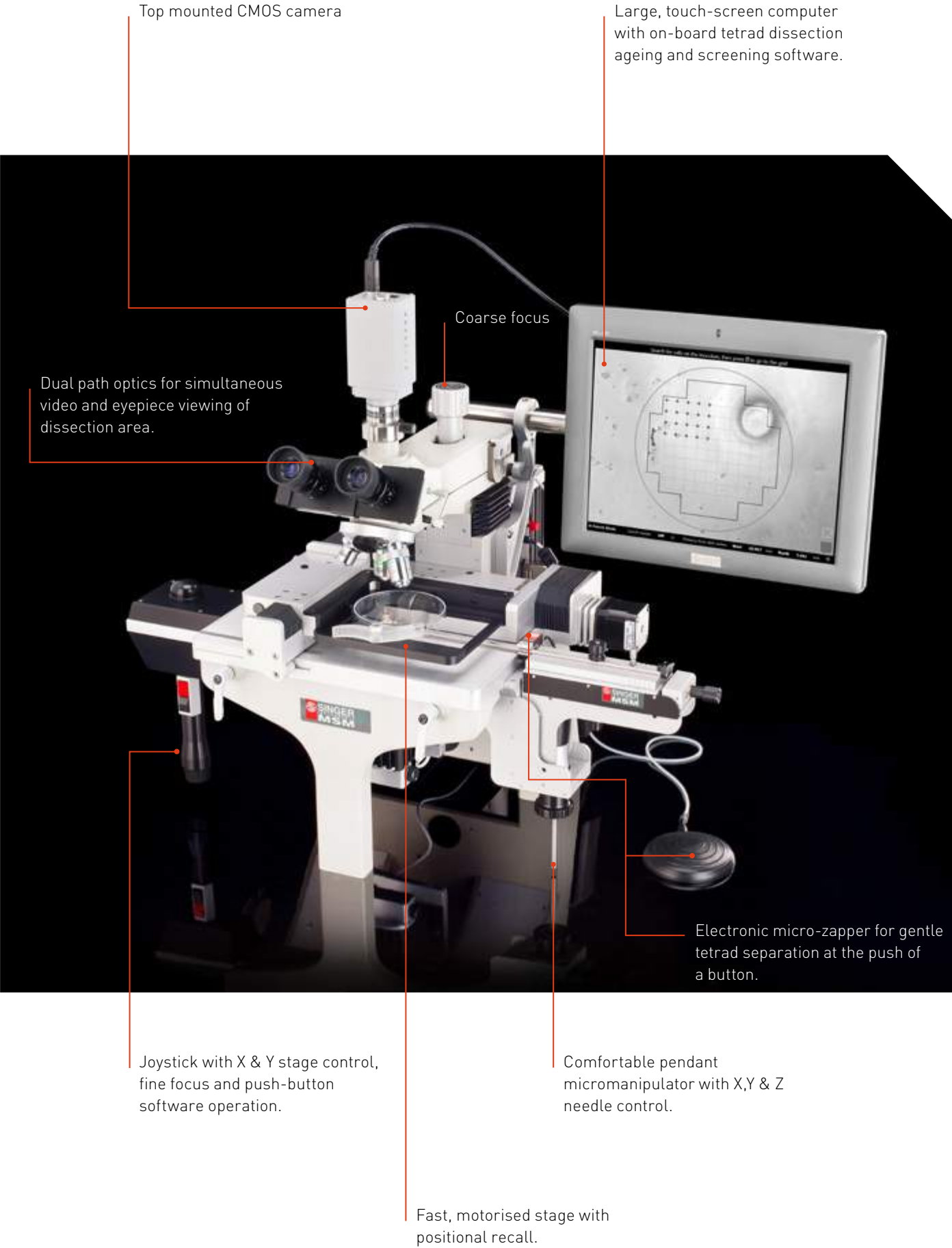
THE  
OPTICS

The special optics included are custom Singer x4 and x20 extra long working distance objectives and x15 widefield eyepieces. The microscope has a daylight-white 50,000 hr. LED light source with intensity control. Condenser illumination is via a special window in the sub-stage to minimise airborne contamination.

THE MICRO  
MANIPULATOR

The MSM 400 micromanipulator can be configured for either right or left-handed users. Set-up is very quick and easy, the manipulator is slotted in and clamped onto the side of the stage and adjustments are made simple with the coarse adjustment knobs. A groove on top of the micromanipulator accepts the tool holder which is secured with the tool clamp.

Needle control is simple and intuitive, a pendant joystick controls damped, vibration free X/Y axis needle movements and a comfortable dial controls smooth Z axis needle movement.







SLIDE HOLDER

Circular adaptor for using standard rectangular glass slides on the MSM 400. Allows cells/spores to be manipulated to and from thin-layer agar on glass slides. Can be used in conjunction with slide grid software built in to the MSM 400.

NEEDLE HOLDER

5mm diameter, 150mm long shank with integrated clear acrylic holder for minimum light disruption and maximum ease of needle setup and replacement.  
An alignment fixture has also been fitted for fine adjustment of needle position and no-hassle needle replacement.

NEEDLE REPLACEMENTS

Each one of our needles is carefully engineered with precision and rigorously quality controlled for strength, light transmission and other special properties necessary for optimal biological manipulation.

LAB SUPPORT

Singer Instruments has a long-standing reputation for fantastic service and support, for which we are very proud. Our motto, 'a responsibility to science', extends to our service and support whereby our primary motivation is to eliminate, or at least minimise, your experimental downtime. Singer products are designed for reliability, longevity, speed, and ease-of-use. Singer Lab Support augment these design criteria by increasing life-expectancy and increasing device reliability with preventative and predictive maintenance. Should any reactive maintenance be called upon, our time, cost and carbon efficient support should get you up and running in the shortest time possible.



Singer Lab Support gives you access to Singer technical experts by phone, email, VOIP or remote access. All requests are entered into the Singer ticketing system that allow both you and Singer Instruments to log, track and monitor any reported issues from initial contact through to resolution. While we aim to respond to all queries within 24 hours, our average response times are far less.

MICRO ZAPPER

We also offer the MicroZapper, an electronically controlled needle agitator providing an elegant way to separate spores. It clamps onto the needle holder and at the touch of a button will vibrate the tip of the needle. No more damaged agar and no more lost spores; the MicroZapper is a valuable accessory for the MSM 400.



CMOS CAMERA

The MSM 400 can be fitted with a CMOS camera, an invaluable tool for teaching and techniques involving time-lapse image capture. Other features include:

- Bit Depth: 8
- Colour: Mono
- Frame Rate: 167
- Interface: USB 3.0
- Lens Mount: C-Mount
- Resolution: 1900 x 1200 (2.3MP)
- Sensor Size: 1/1.2"
- Sensor Type: CMOS
- Shutter Type: Global



*"CUSTOMER SUPPORT IS ALWAYS FRIENDLY, RESPONSIVE AND FAST."*

· Babis Rallis  
University College London  
UK

TECHNICAL SPECIFICATIONS

STANDARD SET-UP

- MODEL:**  
MSM 400™

**PRODUCT CODE:**  
MSM-400

**TECHNICAL SPECS:**  
Footprint:  
· W: 74cm × L: 56cm  
· Height: 56cm (64cm w/camera)

· Weight: 30kg  
· Voltage: 110 – 240V AC

**WORKSTATION:**  
· ×20 XLWD and ×4 flatfield parfocal objectives  
· Ultra bright, dimmable, long-life LED illuminator  
· LWD condenser with stage optical window, iris and filter tray  
· Integrated power supply  
· ×15 wide-field eyepieces and eyecups  
· Width and focus adjustment to both oculars  
· Trinocular head with camera port  
· 35mm coarse focus (manual)  
· 0.75mm fine focus (electronic joystick control)

**TOUCH-SCREEN MCI**  
· 10.1” Ubiquitous Touch Computer with Intel® Atom™ E3825 / Celeron® J1900  
· 10.1” monitor with 16:10 widescreen display  
· Intel Celeron J1900 Quad Core 2.0Ghz Processor  
· 4GB RAM DDR3  
· 32GB Solid State Drive (MLC)  
· Windows 10 IoT Enterprise LTSB 64bit Operating System

**CAMERA**  
· Bit Depth: 12-bit, 8-bit  
· Camera Type: Machine Vision  
· Colour Space: Mono  
· Frame Rate: 167  
· Interface: USB 3.0  
· Pixel Pitch: 5.86µm  
· Resolution: 1920 x 1200 (2.3 MP)  
· Sensor Diagonal 13.4 mm  
· Sensor Size: 1/1.2”  
· Sensor Type: CMOS  
· Shutter Type: Global

- MICROMANIPULATOR**  
· X, Y & Z axis control from a single pendant joystick  
· Left or right-handed stage positioning  
· 5mm shank needle-holder with quick-change needle clamp  
· Ergonomically designed  
· Pendant joystick for ease of use  
· Benchtop height to eliminate fatigue  
· Damped, vibration-free horizontal movement  
· Coaxial ring for smooth vertical needle control  
· Ultra-easy setup
- FOCUS:**  
· Top-mounted course focus dial.  
· Electronic fine focus integrated into control joystick

- NEEDLES:**  
· One complimentary box of ten needles

OPTIONAL EXTRAS

- |  |   |
|--|---|
| <p><b>MICRO-ZAPPER</b><br/>ZAP-002</p>             | <p><b>CMOS CAMERA</b><br/>CAM-001</p>             |
| <p><b>MSM NEEDLES (PACK OF 10)</b><br/>NDL-010</p> | <p><b>DIPS ADAPTOR</b><br/>DIP-001</p>            |
| <p><b>×40 OBJECTIVE</b><br/>OBJ-003</p>            | <p><b>1-YEAR LAB SUPPORT LITE</b><br/>SLS-001</p> |
| <p><b>×20 EYEPIECES (pair)</b><br/>EYE-002</p>     | <p><b>1-YEAR LAB SUPPORT</b><br/>SLS-002</p>      |
|  | <p><b>1-YEAR LAB SUPPORT PLUS</b><br/>SLS-003</p> |



ABOUT US

Singer Instruments was established in 1934 and has a long-standing track record developing and manufacturing mechatronic workstations and laboratory automation robotics. Our world-leading, specialist products are used to facilitate and accelerate genetic and genomic research around the world, for customers who include university research labs, cancer research institutions, pharmaceuticals companies, biotechnology companies and biofuels companies.

Singer Instruments is a Private Limited Company owned by its directors; three out of four of whom are family members. Our premises, on the edge of Exmoor National Park in Somerset in the UK, is a state-of-the-art factory with full, virtual prototyping facilities, precision CNC manufacture, robotic coordinate measurement for quality control, and a lab-coat-clinically-clean and Lean assembly environment. We design, manufacture, program, assemble and QC all of our core products on site.

Having worked alongside and added value to laboratory research for over 40 years, we are a truly integrated and respected member of the genetics research community. We maintain and enhance our brand recognition, scientific knowledge and market research by regularly supporting and attending scientific conferences and meetings and by teaching at workshops. Our tag line ‘a responsibility to science’, acts as a continual reminder for us to do our utmost to support, develop new technology, and add as much value as possible to the science and the scientific community we serve.

Should you have any feedback, suggestions or collaborative opportunities that may help accelerate scientific research, we would be delighted to hear from you. Please email [contact@singerinstruments.com](mailto:contact@singerinstruments.com) or come round to our beautiful offices for a cup of tea!

GET A QUOTE

All information is correct at the time of printing. Some revisions may be made as specifications are improved.







**SIR PAUL NURSE**  
FRANCIS CRICK INSTITUTE  
*TRANSFORMING SOCIETY  
THROUGH YEAST GENETICS*



*OF COURSE THE EUREKA MOMENT WAS WHEN WE CLONED CDC2 BY COMPLEMENTATION. THAT WAS INCREDIBLY TENSE BECAUSE I KNEW IF WE WERE RIGHT, THIS WAS REALLY BIG AND EQUALLY I KNEW ALL THE WAYS IT COULD BE WRONG.*

“ On the whole, society is pretty positive about science. If you look at any of the surveys you will find the figures show 70 to 80% of people are in favour of science and of scientists. And if you compare that with say politicians or lawyers it’s down to 15% approval. Scientists however cannot be complacent because they do discover things which are uncomfortable to people. We do reveal issues that are difficult to handle, like when does life start and when does life finish? Abortions, stem cells and human embryos these are discussions which have spilled out into topical discussion.

would have done more by now. So I’m a bit frustrated about that. I am interested in the complex networks of the cell cycle. People are identifying more and more components of the cell cycle. We name the parts and we do some sort of interactive screening. We say this touches this and you form a network that looks like a London underground map. What disturbs me is, we think we have understood something. The truth is we understand nothing; we just described what we have to consider. How can we make a value judgement and strip away what is unimportant so that we can focus on the essentials. What really matters?

My life is a little complex. I have three jobs! I spend a surprising amount of time with my lab though, much more than people think. I spend as much time there as I do with the Royal Society or running the Crick Institute. Nevertheless I still feel guilty about it, I don’t think I spend enough time there. So I’ve really reduced and refocused what I have to do. I don’t go to many conferences for example. I always have and still do engage with primary results. So I’m not just listening to somebody in a PowerPoint presentation and then putting that data together into a paper. I’m looking down the microscope. I’m looking at gels and at real time PCR plots. I talk about the data with my students, because everyone needs help sometimes. If my post-docs ask for a second opinion I’ll do that for them too, but I don’t want to be breathing down their necks.

When I was working on the cell cycle in my 20’s and 30’s and was really hands on, things happened that had no right to happen. I might have been as lucky as hell or it might have been because I was so immersed in the research. When there was a hint of something, something at all, I took it. Now I’m more “remote”, away from the bench, and what frustrates me is that I can’t help feeling that 25 years ago I

Yeast geneticists invariably have to do tetrad dissection and analysis. Now that is a difficult technique. Actually when I first learned it I did it by hand without a manipulator! I was taught to do that in Switzerland, you need a steady hand for that. The piece of tech which made tetrad dissection easy for both students and post-docs in my lab was the MSM 400 because they saw it as something fun to use, so much so that they forgot to worry about how “difficult” it is picking up and pulling spores apart.

Darwin was a really interesting guy. He had a great imagination but he then supplemented it with this enormous capacity for hard work. Collecting data, observations until you could just collapsed under it, you couldn’t resist it anymore. If you read the origin of the species—which people often don’t do—it is page after page of observation to support his argument.

From modern, or close to modern times, the two scientists that really did impress me were Brenner and Crick. They did some brilliant experiments, very insightful, very clever and laid the foundations for the way we think about the world. What was really embarrassing for me personally was I received the Nobel Prize before Sydney Brenner! This was an absurd fact as far as I could see. Sydney received the prize the following year and so I felt better.

I feel responsible for quite a bit. The first thing to say is this, I have always wanted to have the freedom to pursue what interests me. I realise this is an enormous privilege because I’m being paid lots of money by society to establish and run a laboratory.

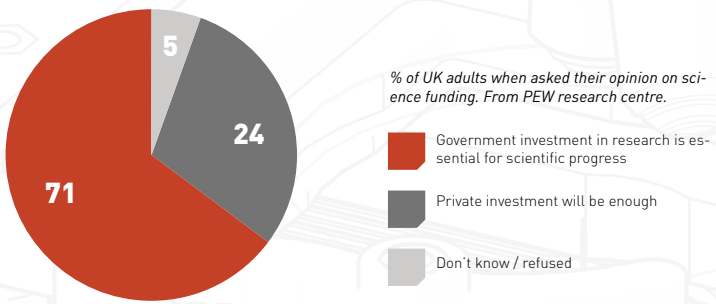


*I THINK SCIENTISTS HAVE A REAL RESPONSIBILITY TO ENGAGE WITH THE PUBLIC.*

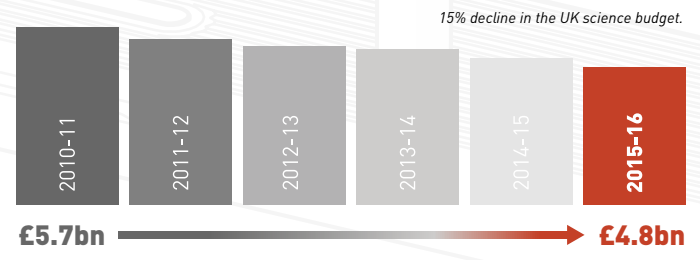
Therefore in some way the work I do has to be to society’s good. I feel responsible for that. On a higher level I feel responsibility, quite seriously, for scientific endeavour in the UK. In the royal society, I’m one of the important defenders of science and the associated budget. I have done a great deal on that in the last 3-4 years of contracting budgets. Frankly science has not done too badly. The ministry of science and the Chancellor of the Exchequer are on our side.

I think scientists have a real responsibility to engage with the public. I don’t think all scientists should do that. In actual fact I think the majority of scientists shouldn’t because most of us aren’t very good at it and why should we be? But when you have people who are good or even very good at communicating their science, who can act as ambassadors, you really should nurture them. We’ve got to take public engagement really seriously.

**PUBLIC VIEWS ON SCIENCE FUNDING**



**UK FUNDING BUDGET, 2010-2016**





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TETRAD  
DISSECTION  
*Read more*



AGE ANALYSIS  
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SINGLE CELL  
SCREENING  
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