



# Artificial Intelligence

Integrated AI Solutions for  
the Asia-Pacific Region

# METASYSTEMS AI

# THE NEW ERA OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence (AI) is nowadays applied to computer science in order to develop machines able not only to fulfil simple functions, but to perform seemingly human tasks based on previously acquired knowledge.

MetaSystems, as a leader in automated scanning and image analysis solutions provider, is uniquely positioned to provide fully integrated AI powered solutions.

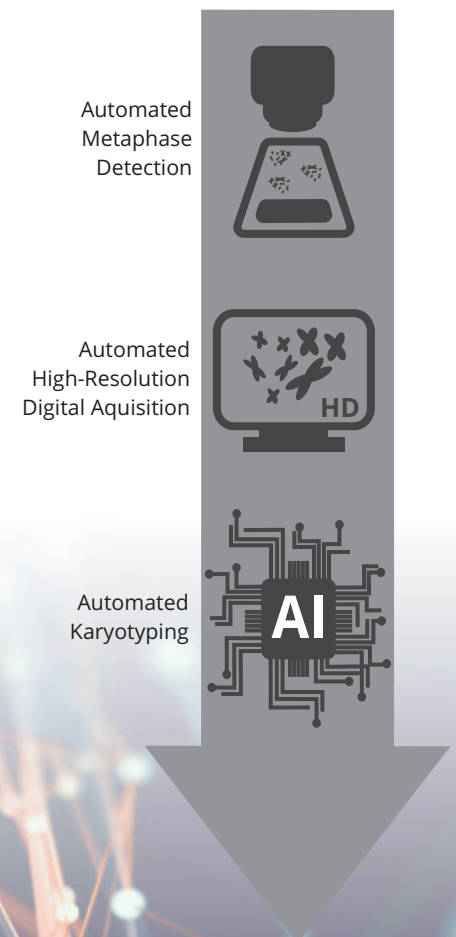


## Ikaros DNN

In this new powerful version of the outstanding karyotyping system Ikaros\*, Deep Neural Networks (DNN), a state-of-the-art application of Artificial Intelligence, will be used to assign chromosomes automatically to their respective classes. The new algorithms have been trained and tested based on hundreds of thousands of pre-classified chromosomes by laboratories around the world.

## An Automated Workflow

Ikaros DNN, in combination with our automated Metafer scanning system, allows the generation of an automated and AI-assisted workflow: from metaphase detection, to metaphase digital high-resolution acquisition, to karyotyping.



*\* DNN support starts with Ikaros versions 5.9 and 6.2. Version 5.9 has been released in 9/2020 while Version 6.2 is scheduled for release in early 2021.*

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# CURRENT AI PROJECTS IN THE ASIA-PACIFIC REGION

Ikaros is only the first out of many future AI-based products in the MetaSystems' pipeline which will allow our customers to increase their workflow efficiency and achieve maximum results with a minimum of operator interactions.

MetaSystems is currently working on the following AI projects and is

For existing Metafer customers to try out our new classifiers for any of the below applications, free of charge for some months. If your Metafer system fulfills the mentioned specification of microscope objective, illumination and camera, you can start right away.

For those customers not currently employing the exact hardware specification or potential customers who do not have any Metafer scanning system yet, to send us their slides, have them scanned and classified at our office and to review the reports and result data remotely via [Neon@WEB](mailto:Neon@WEB).



## MAGAZINES

Metafer's slide frame magazines hold 16 frames with 5 slides each (80 slides in total). A fully equipped SlideFeeder x80 hosts 10 magazines plus one bar code reader.

Each magazine is portable and can easily be taken to the work-bench for loading.



## FEEDER MODULE

The rotating module of the SlideFeeder x80 delivers the slide frames to the motorized stage of Metafer.

The device runs unattended and is prepared for 24/7 operation - including intelligent priority sample handling.



## AUTOOILER

If the current workflow requires the use of an immersion oil objective, the automated oil dispensing device is engaged.

Detailed sample dependent macros control optimal oil dispersal for each sample.





## CAMERAS

MetaSystems CoolCube cameras are designed with excellent imaging and automation in mind.

These provide seamless automated integration with Metafer enabling optimal performance.



## MICROSCOPE

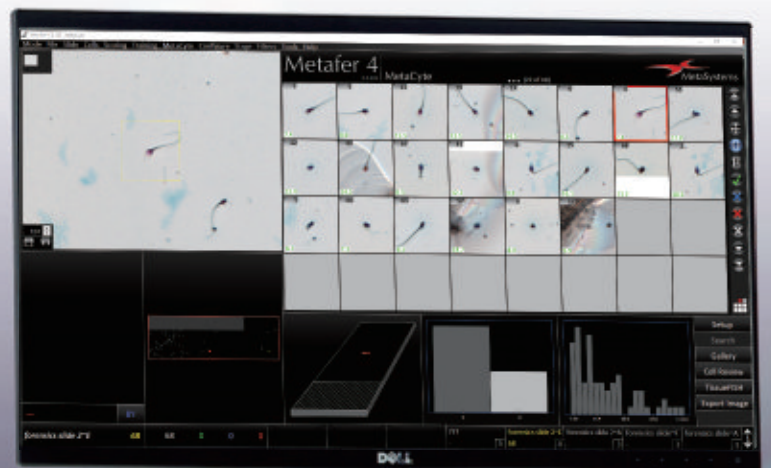
Metafer integrates a motorized, high-end research microscope equipped with a stepping-motor stage of highest precision.

All features of the microscope are directly driven by Metafer software.

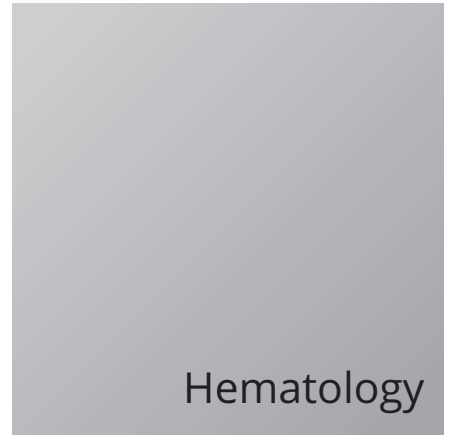
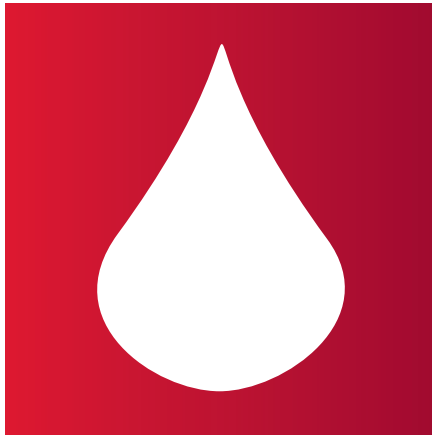


## SOFTWARE

The PC based Metafer software controls the scanning hardware and provides a convenient user interface prepared for all-day, routine use. Thanks to the exceptional classifier concept each Metafer provides the optimal balance between flexibility and standardization.







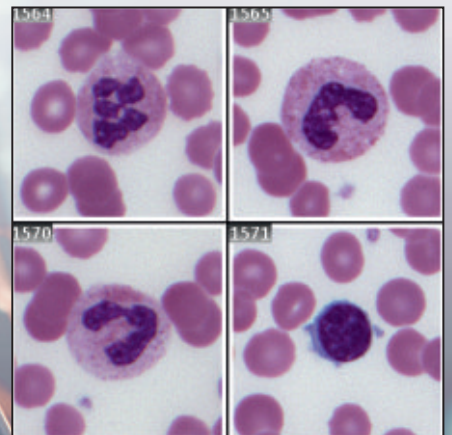
### White Blood Cells (WBCs) Classification

WBCs (also called leukocytes) are the cells of our immune system involved in protecting against infectious diseases and foreign invaders. WBCs' classification and counting under the microscope is a clinical front-line test and it gives important information about patients' status. MetaSystems developed a new AI-based WBC classifier able to detect, count and classify leucocytes from blood smears.

**Camera:** CoolCube 4c

**Objective:** 40x Oil

**Light:** Transmitted Light



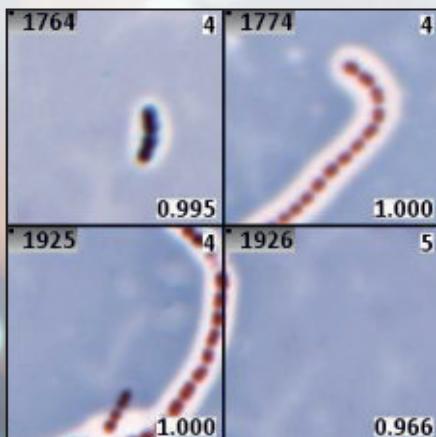
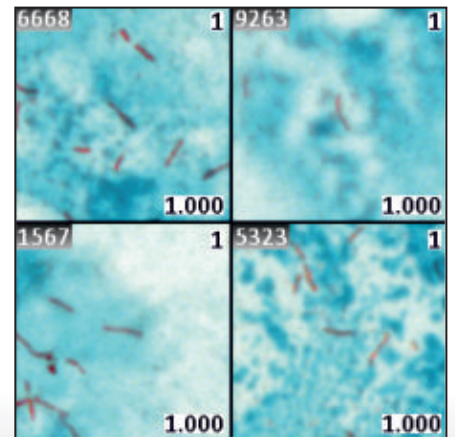
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### Mycobacteria tuberculosis (TB) Identification

Rapid diagnosis of tuberculosis infection is critical for initiation of treatment and control of TB. Sputum smear microscopy (SSM) of acid fast bacilli is still the most common TB diagnostic test because of its simplicity and associated low cost. However, manual reading of stained slides is time-consuming and results' quality may be influenced by subjective factors. The AI-based classifier can detect automatically Acid Fast Bacteria, both in Auramine and Ziehl-Neelsen staining, helping to save time, contain costs, and boost sensitivity.

**Camera:** CoolCube 4c  
**Objective:** 20x (ZN), 10X (Auramine)  
**Light:** Transmitted Light (ZN), Fluorescence (Auramine)



### Detection and Classification of Gram-Stained Bacteria

Gram stains have essential functions in the clinical microbiology laboratory. No other method provides as global a picture for an early diagnosis of specimen quality and organisms present for an early diagnosis. The automatic AI classification of Gram samples is able to detect and sort several different classes of microorganisms from blood cultures, including Gram-positive diplococci, clusters and chains, and Gram-negative rods and yeasts.

**Camera:** CoolCube 4c  
**Objective:** 40x Oil  
**Light:** Transmitted Light

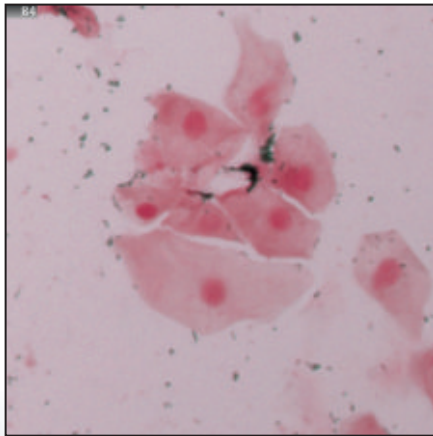
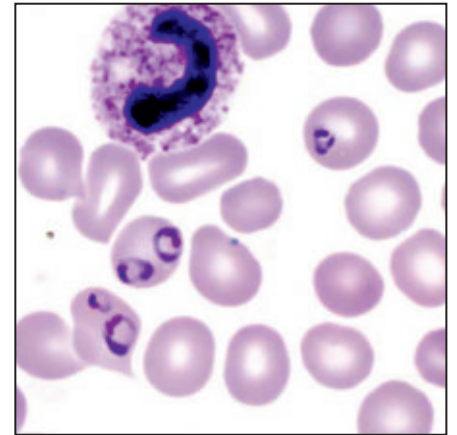
*The applications on this double page are Research Use Only (RUO). Not intended for clinical diagnostics*



## Detection of Malaria (Plasmodium) in Blood Smears

Malaria is still responsible for hundreds of thousands deaths every year (in 2018, 228 million cases and 405 thousand deaths were reported). A timely diagnosis of malaria is the first step for an appropriate and prompt treatment aimed to save lives. Manual microscopy is still considered the gold standard for malaria confirmation. Our AI Malaria classifier is under development and is expected to detect and classify different species and stages of Plasmodia from blood smear slides.

**Camera:** CoolCube 4c  
**Objective:** 40x Oil  
**Light:** Transmitted Light



## Clue Cells Analysis

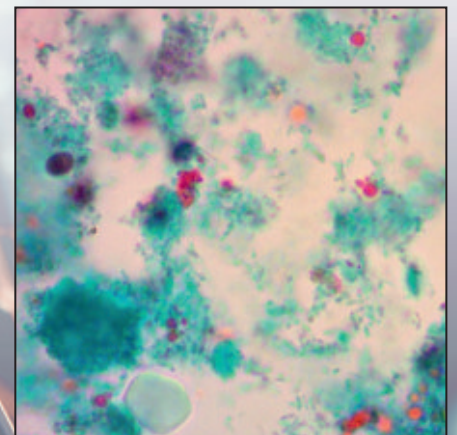
Bacterial vaginosis is the most prevalent cause of abnormal vaginal discharge, occurring in more than 5% of women and it occurs when the normal vaginal flora is replaced with anaerobic bacteria. In clinical practice, the check of presence of at least 20 percent of clue cells (vaginal epithelial cells with borders obscured by adherent bacteria) during microscopy is one of the main three tests for bacterial vaginosis diagnosis. MetaSystems is now developing a new AI-based classifier for unattended automated scanning and detection of clue cells.

**Camera:** CoolCube 4c  
**Objective:** 10x  
**Light:** Transmitted Light

## Trichrome Enteropathogens Detection

Trichrome staining is a common tool for protozoa and other parasites identification from stool specimens by microscopy. However, the analysis of Trichrome slides can be a tedious and very time consuming job. Indeed, manual scoring of a single slide can take up to 30 minutes. Moreover, scorer fatigue can lead to inaccurate results. The AI classifier aims to automatically classify different enteropathogen species from scanned trichrome slides.

**Camera:** CoolCube 4c  
**Objective:** 20x  
**Light:** Transmitted Light



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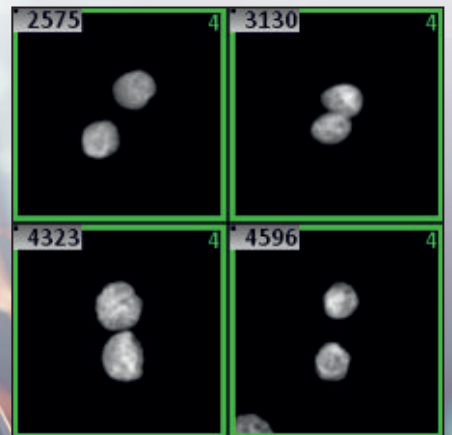


### Classification of Nuclear Genotoxic Abnormalities

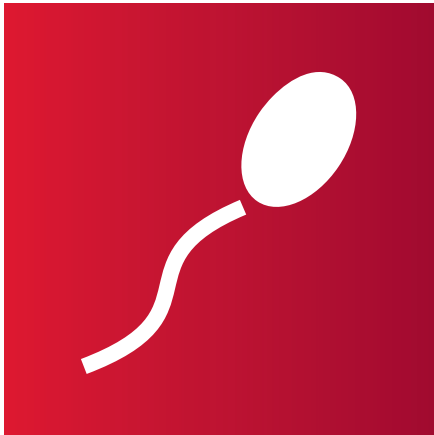
Micronuclei, nucleoplasmic bridges, and nuclear buds are well known markers of chromosome instability and genotoxicity.

The analysis of these cells exposed to toxic substances can provide insight on potential genotoxic effects. We are currently developing an AI-based classifier able to automatically detect and classify these aberrations.

**Camera:** CoolCube 4m  
**Objective:** 10x  
**Light:** Fluorescence Light



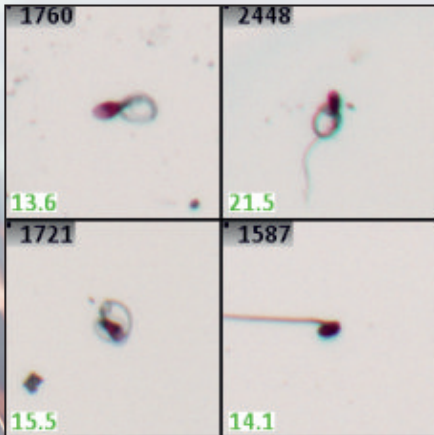
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### Sperm Detection

In the majority of sexual assault cases vaginal and vulval swabs and their corresponding smears are collected from the complainant to detect the presence of spermatozoa. However, the overall number of spermatozoa can be very low, and usually there is an inhomogeneous background of debris and other cells. Metafer microscope automation can be an efficient aid to solve sexual assault crimes. The new sperm finder classifier, based on AI, increases dramatically the number of sperms detected in forensic vaginal swab specimens.

**Camera:** CoolCube 1m  
**Objective:** 20x  
**Light:** Transmitted Light



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## ASIA

MetaSystems believes that a global company should foster a community of partners and customers to achieve a climate of collaboration and friendship. Our office, based in Hong Kong Science Park, with its trained and motivated staff, allows us to work very closely with our customers in Asia. We know that communication is crucial to achieving our main goal: to continuously improve our understanding of demands, requirements, and wishes of lab professionals.

MetaSystems is a leader in automated digital microscopy solutions. With over 30 years of experience, we provide only premium hardware, software, and service with our products.

If you have any questions relating to the contents of this brochure please contact us!







**MetaSystems**

Innovative Solutions for  
Automated Imaging

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*Within the European Union Ikaros and Metafer are in-vitro-diagnostic devices (IVD) and are CE marked. Outside the EU and depending on the local regulations these products may not be available for diagnostic purposes.*



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