

# Swiss Virtual Animal Pathology: [www.animalpatho.org](http://www.animalpatho.org)

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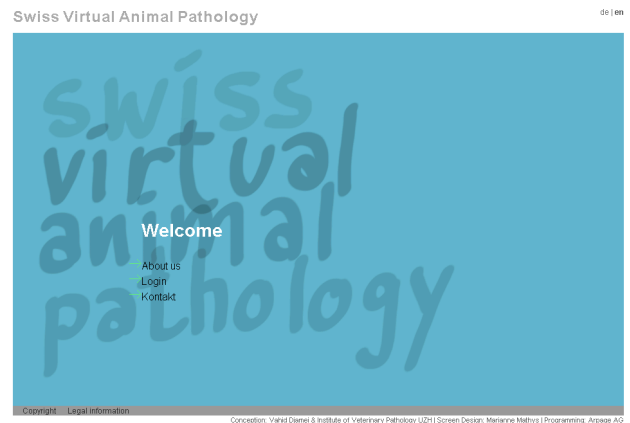
## ABSTRACT

The pedagogical challenge to the teaching veterinary pathologist is integrating visually-based learning with in depth understanding of disease mechanisms. This process is heavily image dependent, didactically best taught in a highly interactive manner. To achieve this, the teaching of pathology within the curriculum of veterinary medicine or human medicine is divided into two major areas: General pathology deals with principles of disease processes as a basis for understanding the reactions of a multi-cellular organism to adverse effects from within the organism itself or from the environment. Specific pathology, building on the principles of general pathology, explains the malfunctions of individual organ systems and relates them to disease processes of a patient as a whole. To meet the needs of swiss students of veterinary medicine, and those of advanced students specializing in pathology and studying for the European Board qualification (European College of Veterinary Pathology, ECVP), we are developing this new integrated online e-learning platform in veterinary pathology (<http://www.animalpatho.org>). In the near future, we hope this will also serve an international audience of veterinary pathologists.

**Keywords:** Veterinary pathology, virtual slide, e-learning, virtual pathology, distance learning

## VETERINARY PATHOLOGY ONLINE

The login to Swiss Virtual Animal Pathology (SVAP) is freely available to all interested parties and ensues over the opening page.

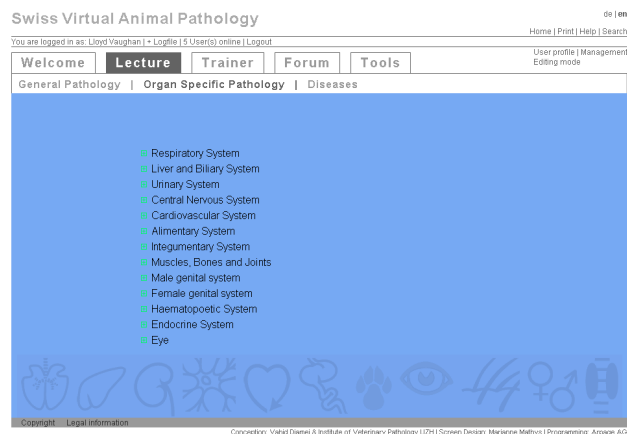


**Fig 1.** Welcome page of SVAP with login button to register the user.

Currently, languages are English and German, between which one can readily switch by clicking on the icons "de/en" at the top right corner. We plan to expand this to include a wide range of international languages in the future to permit access of students and veterinary pathologists from all interested countries. Breaking down the language

barrier(s) to further and continuing education is a vital component in cross cultural exchange and is an essential element of this online program. This will aid the communication between students and experts, both didactically and scientifically. Although many diseases and health issues are universal, others are restricted geographically. We anticipate that through this effort, experts will obtain access to special cases from specific countries and areas. Conversely, students and trainees from disparate regions will be able to access cases from around the world which they would not normally meet in their local areas. This is particularly important for training in the surveillance of new and re-emerging diseases.

In line with international pathology curricular, the platform (<http://www.animalpatho.org>) is divided into four sections, Lecture, Trainer, Forum and Tools. The section lecture is itself divided in general pathology, organ specific pathology and exemplary cases of specific diseases.

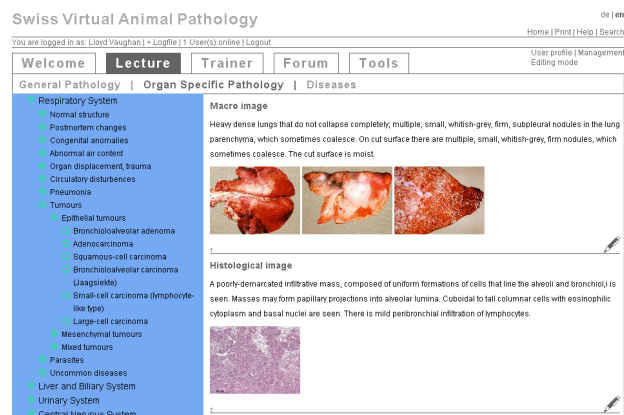


**Fig 2.** Layout of SVAP, with the page "Organ Specific Pathology" opened within the section "Lecture"

One aspect of our didactic concept centres on providing a document or learn object for a particular subject or theme. For instance within the Organ Pathology section, which is planned to cover all major organ systems, the student chooses a particular organ (such as Respiratory System, say), then from a range of topics selects

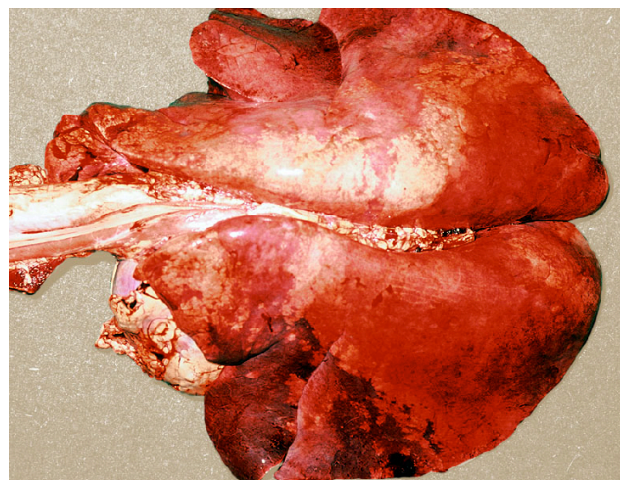
"Tumors" and out of the Epithelial Tumor subset, the specific tumor and learn object "Bronchioloalveolar carcinoma (Jaagsiekte)".

The window at the right side can be scrolled, but also printed out for study purposes away from the computer. It contains a standard protocol to review the clinical and pathological data, very much in the way a practicing pathologist would approach a case. The thumbnails shown are linked to full size images which appear in additional windows.



**Fig. 3a.** Learn Object "Bronchioloalveolar carcinoma (Jaagsiekte)".

The macro images of the organs appear with a short explanatory text, as illustrated below.

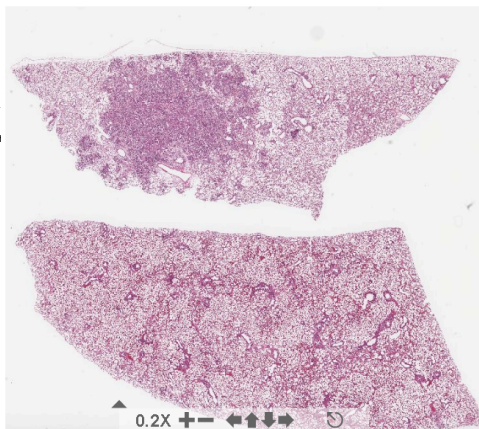


**Fig. 3b.** Heavy dense lungs that do not collapse completely; multiple, small, whitish-grey, firm, subpleural nodules in the lung parenchyma, which sometimes coalesce

This is followed by a thumbnail in the next paragraph for a "virtual histology slide" produced using line camera scanning technology (Aperio Technologies, Vista, CA. <http://www.aperio.com/>). The slide can be navigated online, much like the pathologist would do on the microscope and so trains the student to search for specific diagnostic features.

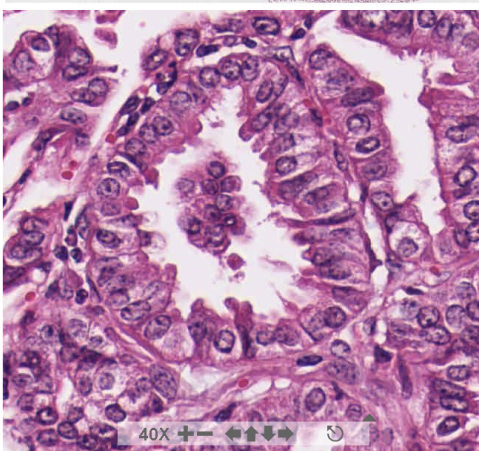
#### Adenomatosis

A poorly-demarcated infiltrative mass, composed of uniform formations of cells that line the alveoli and bronchioles is seen. Masses may form papillary projections into alveolar lumina. Cuboidal to tall columnar cells with eosinophilic cytoplasm and basal nuclei are seen. There is mild peribronchial infiltration of lymphocytes.



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**Fig. 3c.** Virtual slide in overview (top panel) with navigation buttons along the bottom of the image and a short explanatory text to the left. A higher power view from the same image showing more detailed features, but retaining the text and the navigation buttons is shown in the lower panel.

Virtual slide repositories and their use in training and diagnosis is an important development within the field, giving rise to active discussion of their utility within medicine in general [1-7] and in veterinary pathology in particular [8, 9]. Vital is to embed the visual data within a clear didactic framework, as we

are attempting to provide, otherwise the student is rapidly overwhelmed with the image and data flood and the learning effect is lost.

Furthermore, we are providing a pathology trainer for student self study and an expert forum for communication. A Tools section encompasses the complete image data repositories and can be used for selective or random knowledge testing of image sets or as a source of images for use in reports, lectures, etc.

The main technological aim is to provide a highly integrated and dynamic online platform for teaching a subject interconnecting a wide range of medical and scientific information with visual data ranging from macro-images and schematic diagrams of organs and tissues (cm to m range) to histological images (sub-micrometer range) and the integration of general pathology in specific pathology and linking to exemplary cases. The program is designed to equally fulfill the needs of a distance learning course or be integrated in a University blended learning approach [9].

Overall quality of content is assured through two European board certified pathologists in the leading house team. Content of individual units is guaranteed by two experts responsible for each unit, at least one of which must be board qualified. These authors are listed along with their units they have authored under the impressum section of the welcome pages. In addition, we are aided by a team of international experts assembled to monitor this process. The success of these efforts can be gauged, at least in part, by [animalpatho.org](http://animalpatho.org) recently becoming the official online training program for the board examinations of the European Society of Veterinary Pathology (ESVP). The ESVP sets the gold standard for international postgraduate college teaching through the European College of Veterinary Pathologists (ECVP) together with sister association, the American College of Veterinary Pathologists (ACVP).

In the latest development, we are now extending the scope to include clinical veterinary medicine. Clinicians will be presented with the clinical case, then led through the pathological analysis, including diagnosis, and concluding with recommendations for clinical treatment. Our aim here is to integrate the clinic with the pathology, including undergraduate teaching and postgraduate support for the practising clinician. On the other hand, the pathologist will receive a better insight into the clinical background and anamnesis of the pathology presented. Should these projects be successful, then we are hopeful of being able to ultimately realise our vision of providing not only an internationally recognised platform at the highest level, but one which will also be of interest to developing countries, especially in eastern Europe and in Africa.

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