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TRACING LIFE: THE HISTORY, CONCEPT AND GOALS
OF THE NEW PERMANENT EXHIBITION IN THE BERLIN
MUSEUM OF MEDICAL HISTORY AT THE CHARITÉ

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SUMMARY

The Berlin Museum of Medical History at the Charité has been in existence since 1998. The institution aims to showcase medicine, yet it wants to show not only what medicine is but also and especially, how medicine came to be what it represents today. In its new permanent exhibition, opened on 25 October 2007, the museum takes a look at the development of medicine from a western, natural historical and scientific perspective over the last three centuries.

By using the exhibition title “Tracing Life”, The Berlin Museum of Medical History at the Charité makes a conscious connection to a scientific approach of one of modern medicine’s founders, the Berlin physician, scientist and politician Rudolf Virchow (1821-1902) espoused as a guiding principle¹. As a pathologist, Virchow worked exclusively and explicitly on and with the bodies of dead human beings. Through his dissections and his macroscopic and microscopic studies, however, his research aimed at looking back at life to determine the course of diseases and also to find more precisely where the strength for resistance lay in the living human organism. He thus arrived at a unique analogy²: as a Prussian civil servant and a citizen predisposed to a republican form of government, he demanded during the Revolution of 1848 a democratic government formed as

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a federation of individuals with equal rights. Under the microscope he saw complex interdependent human tissue in a similar way as a democratic organism, composed of equal, but at the same time variously talented individuals: the cells.³ With his demand to fathom the talents of the cells in detail and to search for specific indicators and mechanisms of disease⁴, Virchow determined a biological approach for western medicine that is still largely followed today.

1. Early History

This probing into life characterizes not only Virchow's approach as a researcher, but also his interests as a collector and museum founder. In 1844, when Rudolf Virchow began his professional career under the Charité dissector Robert Froriep (1804 - 1861), he found that a collection of over 2,000 human pathological wet and dry specimens already existed in the dissection department of the hospital.⁵ Two years later, he succeeded Froriep as dissector. In 1847, his honored mentor recommended that he arrange the specimen collection according to a two-dimensional static morphological system in special showcases built for the purpose. Froriep wrote to Virchow: "In ordering the items for the collection I had the plan of bringing together pathological processes with the organs, which is only possible when the two principles are allowed to cross, that is with the organs from top to bottom and the pathological process from left to right".⁶

Out of respect for his teacher, Virchow carried out Froriep's ideas, but admitted at the same time that he "did not agree with the reason for some of the arrangements".⁷ The background for his skepticism was a fundamental scientific view that Virchow had confirmed regarding the status and future of his field of pathology during his two-month study tour of Prague, Vienna and Salzburg. In his travel report, written in 1846⁸, he consolidated his realizations into a demand that, "pathological anatomy must be an independent scientific field, which, in order to retain its meaning as a foundation for practical medicine, must return

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from the dead to the living and form itself into pathological physiology.” For future research this meant that pathology must no longer concern itself only with “the representation of products of disease, [that is,] the material changes of parts that have already occurred and are thus concluded” and must not allow itself to be reduced to “being able to do nothing more than create a terminology, to describe objects and their characteristics and to find their differences – finally to make a classification.” In future it must focus much more on the “genesis of these products, the developmental history of new pathological formations, the anomalous course of living processes which determined these products and new formations.” “The educated pathological anatomist,” continued Virchow, “cannot concern himself with the product without questioning the mechanism that brought it about and the conditions under which these vital processes experienced this or that deviation from their course.”



Fig.1 - Pathological Museum in 1900, Berlin

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In order to make the developments in disease processes visible, Virchow established and carried out a large collecting project after his return from Würzburg to the Charité in 1856. Until the end of the 19th century, he and his assistants prepared countless specimens from the extremely high number of dissections undertaken in his Institute for Pathology that were then placed in his collection⁹.

In 1899, Virchow was finally able to fulfill his long-time wish on the grounds of the Berlin Charité and to open a Pathological Museum built according to his own ideas.¹⁰

At that time, his collection included 23,066 wet and dry specimens. Almost all of the diseases then known were present in this three-dimensional body inventory.

Over a museum exhibition space of 2,000 m² on five floors, Virchow wanted to realize his own dynamic exhibition concept. Above all he wanted to use his impressive organ specimens to show one thing: extremely compact series of specimens that demonstrated the typical course of the particular disease on the parts of the body that were primarily affected as well as in their secondary or tertiary locations¹¹.



Fig.2 - Exhibition Hall of Museum in 1904

All of the objects presented came from patients that had died at the Charité. His goal, however, was to begin with very first, barely perceptible signs of disease and to continue with a series of 20–40 individual specimens through to the final stage to make the processes of the disease visible. Regarding the perception of his “viewers”, he aimed specifically at a visual understanding of the disease process in the living, yet diseased body¹².

From the beginning, Rudolf Virchow’s Pathological Museum served two audiences: the students could follow the lecture of the professor in the museum’s own lecture hall and deepen their knowledge of pathology in the adjacent teaching and study collections, through, according to Virchow, “direct perception”¹³ of the specimens. Interested laypeople could take “a look under the skin” on two of the five exhibition floors. Diseases and their typical courses should be understandable on the basis of a comparative view of specifically prepared, systematically collected and coherently arranged specimens without much text. According to the initiator, what was seen and understood should, where applicable, lead to a new approach to individual behavior in relation to health and disease¹⁴.

2. The Concept

Virchow’s Pathological Museum no longer exists. The Berlin Museum of Medical History at the Charité now occupies the same place, in the same building¹⁵.

Although the name has changed, the museum operates in harmony with Virchow’s approach. The new permanent exhibition allows for a view of the opened body and leads visitors expressly back into life. More specifically, it enters the world of the sick who have turned to medicine in the face of a threat to their health in hopes of help with their recovery. However, the exhibition not only reaches back into history with its 1,400 objects in a space of 800 m², it also brings the visitor into the present¹⁶.



Fig. 3 - The Museum today

The presentation begins in 1700 and describes medical access to distinct organ formations. It asks what anatomists and pathologists discovered at various times with their knives and microscopes and to what extent which bodily functions were understood by the experimenters in their laboratories. The focus is on heart and brain, muscles and nerves, but also on structures and mechanisms in the smaller and smallest units of life: cells, molecular groups and genes. In many different ways, light is shed on the activities of the living body in the healthy as well as in the sick that have been found, captured and chronicled or demonstrated.

In the documents presented, such as specimens, models, moulages, instruments, illustrations, curves and photographs, highly specific notions of the body appear – bound by time and context¹⁷. Even today, medicine uses these notions to debate about its own concepts of the

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Fig.4 - Permanent Exhibition



Fig.5 - Specimen Collection

human body, concepts that have a decided influence on the perceptions of the nature of the living, in particular also of the essence of the human being in our culture¹⁸.

Which picture of the diseased body physicians and pathologists in Virchow's time, i.e., in the second half of the 19th century, held, can be understood by examining a major focal point of the museum, the large specimen hall.

This area leaves a particularly lasting impression on public perception and can be interpreted as the core element of the whole museum. An anatomical matrix is created in the room through eight spacious original glass showcases. Every showcase front is dedicated to an important human organ or a more complex bodily system, that is at first introduced in its regular morphological and functional form. Further along in the showcase, visitors are confronted with a selection of specimens of major diseases that typically attack that particular bodily structure. Each organ "chapter" is rounded out with a particular disease that has either had a special historical importance, such as tuberculosis or kidney stones or represents today a particularly great threat to health in our area of the world, for example skin cancer or heart attack. Numerous specimens from the museum's collection are displayed and some are arranged suggestively in rows and series following Virchow's ideas. Thus, the potential spread of a problem in the affected organism or the development of diseases in their characteristic courses can be demonstrated¹⁹.

In a second step, the exhibition asks about the consequences of various research approaches for medical treatment of the sick. It shows how medicine has made an effort during various eras to differentiate diseases. For the 19th century, in the course of the "birth of the clinic"²⁰, what becomes clear is how medical views at the sickbed changed in view of the knowledge gained by pathologists during dissections. Similarly, surgeons, steeped in a scientific understanding of the body, began to alter their working habits in the oper-

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ating room based on the incorporation of the latest developments in the areas of narcosis and anesthesia and the practice of hygienic measures when planning larger and longer operations. Furthermore, visitors learn what importance individual internal medical treatments, for example, Emil von Behring's diphtheria serology or Paul Ehrlich's chemical-pharmaceutical therapy, had about 1900. In the process of increasing specialization, new fields were formed and became independent²¹.

A central exhibition module focuses on a social catastrophe in which German medicine of the 20th century – not alone as a result of its clinical, biologicistic approach – experienced its darkest moment: National Socialism. Thoroughly “normal” objects – syringes, operating instruments, medications, microscopes, and established textbooks – provide insight into customary medical practice in the 1930s and 1940s. On the other side of the showcase, the same objects are



Fig.6 - Lab. Neurosciences

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shown in a different context. Under the catchwords racial hygiene, compulsory sterilization, experiments on humans and euthanasia, their function as part of the goals of inhuman medicine under National Socialism can be seen²².

At a number of points, the exhibition also expressly addresses central aspects of contemporary medicine. For example, the presentation allows a look into the research laboratories of genetics and the neurosciences.

A question is posed about the last riddle of life: are human beings in their biological, emotional, intellectual and social aspects completely determined by organic factors, as some important voices would like us to believe, or is there such a thing as free will, and if so, what is its nature²³?

The argumentation of the exhibition follows two essential lines that are connected partially through their spatial and partially through their



Fig.7 - Moulage Collection

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temporal arrangement. Much of the exhibition follows an expressly medical view of things on the basis of the Virchow paradigm. At particular points, however, it changes its viewpoint consciously and the outlook of the sick or even of a particular patient comes to the foreground²⁴. Directly adjacent to Rudolf Virchow's desk, a collection of 36 facial moulages from sick people who were treated in the first 10 years of the 20th century at the Charité Eye Clinic is shown in a large showcase.

The arrangement represents an archetypal collection and the systematic representation of illnesses as would have typically been shown in hospitals at that time by young, self-assured medical specialties, such as ophthalmology²⁵. At the same time, the historical patients, with their specific sufferings fixed in wax, appear before the visitors of the museum and demonstrate in a highly individual way through their facial expressions the signs of their physical and emotional reactions²⁶.



Fig.8 - Patients Ward

In a newly developed historical patient ward, unique in the museum landscape, patient history is displayed using museum objects. Modeled on the impression of a patient ward as photographed in 1910 in the Medical Clinic of the Charité²⁷, visitors encounter ten beds with people suffering from various problems in the time between 1727 and 2006. The foot of the bed has been made into a showcase in which the real historical individual together with the specific state that led her or him to seek help in an inpatient part of the hospital, usually in the Charité, is introduced. The mattress of the bed has been converted to a 10-centimeter-high standing base on which selected relevant objects from the patient's world and medicine meet. The head of the bed has been constructed as a high, standing glass showcase in which medicine has been asked what it knows, or knew at that time, to offer to the specific person seeking help. In this modular arrangement, visitors meet, for instance,

- a young pregnant woman under the key phrase “difficult birth” who is delivered of a baby in transverse presentation at the Charité in 1727,
- a man with fever and malarial symptoms who was helped briefly by taking china bark in 1844,
- a three-year-old boy with polio who lay for many weeks in an iron lung in 1958 before the introduction of oral immunization,
- a young and highly gifted young woman who developed a psychosis and finally took her own life in 1969 after many stays in the hospital,
- a person with liver failure who received a new organ in 1990, and
- a middle-aged man who got a splinter in his finger shortly before Christmas 2006 and two weeks later, because of subsequent blood poisoning, fought for his life in intensive care²⁸.

On the one hand, the presentation connects with the original function of the Virchow museum building, taking as its starting point the cultural technology of anatomical dissection and arguing in general along the traditional lines of a scientific understanding of the human body. On the other, it consciously relates to its topographical environment. From the beginning, the museum stood on the grounds of the Charité, surrounded by clinics and institutes of this well known and respected Berlin hospital. These two exhibition levels are connected by a broadly conceived text-picture tableau and populated every now and then with smaller showcases displaying in passing much information about the history of the Charité²⁹. The representation begins with the founding of the institution by the king in 1710 as a plague house outside the city walls. An overview shows the development from military hospital to university hospital, in the meantime in four different locations in the German capital.

3. Historical rooms

The exhibition leads the visitor explicitly through a series of highly specific spaces that medicine has brought forth in the course of its history: the anatomical theater, the private anatomical museum, the pathologist's dissection hall, the hospital after 1800 with its sick beds, the clinical research and teaching collections, the laboratory and, finally, the patient ward. These spaces and the practices that were conceived and realized there³⁰ stand for certain basic medical subjects, which are brought out by the careful display of central objects supported by texts and pictures. The point is always general developments in medicine. Where practicable, local conditions at the Charité or in Berlin medicine are used as examples.

The design of the exhibition works consciously with the historically present architecture of the original museum building³¹. The walls of the exhibition rooms with their numerous windows in general remain free. The specially constructed showcases have been placed

in such a way that the intended path through the room is generally clear. Each room is dedicated to an historical topic and marked by a pictorial motif that has been screen-printed on large pieces of textile and placed in front of the windows. The transparency of the window dressing allows daylight into the exhibition rooms but also allows a schematic view of the historical grounds of the Charité. The exhibition room is thus enlarged in the perception of the visitor and extended by this impression to the adjacent buildings.

4. Argumentation with Objects

The new permanent exhibition of the Berlin Museum of Medical History at the Charité has realized an academically demanding concept that focuses on a certain theme. The methodological considerations had their beginning during the analysis of the topographical context and the related self-image of its umbrella organization – the Charité as university hospital in Berlin's Mitte district. The hospital grounds that visitors enter are only a few minutes on foot away from the political center of the German metropolis. Many visitors see in the museum a medical institution where they are guests, where they can take a look behind the scenes at the otherwise hermetically sealed world of medicine. In this medical location, they expect to find central objects from research and teaching, diagnostics and therapy, or even – perhaps especially – special objects, such as human specimens³². This appears to them as legitimate since they know that students at most German medical schools become acquainted with the construction of the human body through their anatomical dissection course and the corpses they encounter there, thus receiving their real induction into the profession of medicine.

When looking at the demands of practical medicine it becomes clear how necessary it is to have an atmosphere of trust and privacy. The personal things that are discussed directly with a physician are protected by the rules of patient/physician confidentiality. Every

presentation in the museum, especially the display of specimens, involves a subjective component, namely aspects of real historical patients. This means that the objects on display must to be handled with respect and shown in an anonymized form³³.

As in other museums for the history of culture and science, the Berlin Museum of Medical History at the Charité presents its subject matter using objects, supported by texts and illustrations. Belonging to the environment of a medical university, the museum team understands its practice of exhibiting as independent work on an academic basis. More precisely, they view exhibitions as a special form of publication that is no more or less academic in its presentation than other established forms. Just as a solid professional text needs a central thesis, so every successful exhibition must have a central message. Just as a text develops its subject using an analytical structure with references and footnotes over a limited number of pages, so an exhibition offers a discursive path through the exhibition space. Its contents and arguments are more or less obviously embedded in the exhibition items that are placed carefully in the space and put in connection with one another, and are allowed to speak for themselves through the use of media, likewise with commentary, references and sources³⁴.

The moment of contextualization is of central importance in either case. Each major text, unfolded along a line of argumentation, partially in analytical, partially in narrative form is never a completely homogeneous story. There are always – whether on paper or in a stroll through the room – breaks between letters, syllables, sentences and thoughts as between objects with their textual and pictorial commentaries and the meanings contained therein. The context thus leaves the reader, just like the exhibition visitor, room for digressions, afterthoughts, associations and productive projections.

Formulating texts is a common, largely standardized practice that has long since been considered legitimate and well-respected in all academic fields. The exhibition as an academic publication format

still has to be recognized and taken seriously. Exhibiting is of course not simply the formulation of texts with other means in another place. An exhibition, in comparison to a text, has its own specific qualities. While each text presents its contents, even when these are enriched with illustrations and tables, only in a defined order on a two-dimensional medium, the pages of a book or a journal. And even a virtual text, despite links, is still offered on a flat screen. Yet the exhibition presents its argumentation fundamentally in three-dimensional space. Therein lies the great challenge: to think about contents in space, to provide a spatial structure for the line of argumentation. This is one of the essential elements of a medical or scientific historical exhibition. In the act of presenting knowledge three-dimensionally, the argumentation to a certain degree takes on a creative form that shares elements with art.

In a university medical context, exhibiting can contribute to academic research. Exhibiting is based on extensive study of primary sources, research, analysis, conclusions and discursive-contextual publications. In the intermittent moments of crisis as an exhibition is being constructed, the concept and its fundamental message must prove themselves. Not infrequently at these moments, it becomes clear in reconstructing contexts that there is a break, a false assumption or an incorrect conclusion in the argumentation. In the drama of the last days before an exhibit opens, it becomes necessary to rethink, to look deeper, to exchange objects or arrange them differently, not only to save the context, but to make it clearer and more coherent. It is at these moments that scholarly activity is being performed in the best way. Not until all of the objects with their inherent arguments have found their specific, well-thought through place in the room do the theses become strong and convincing.

For visitors to the Berlin Museum of Medical History at the Charité, professionals as well as interested laypeople, a tour through the permanent exhibition can be many things – relaxation, entertain-

ment, but also an examination of the themes presented. The spatial presentation of scholarly contents communicates not only certain facts, views and insights. At its best, it also provokes reflection and questioning that encourages the recipient to undertake her or his own further research. The contents shown can provide impulses for further scholarly work. Thus exhibiting can be declared a scholarly practice for the dynamic continuation of contextual reconstruction. In short: Context is everything!³⁵

5. Scholarly Work in the Museum

In order to use an exhibition as a scholarly publication format, the objects must have been researched prior to being shown. The Berlin Museum of Medical History at the Charité follows two approaches in this respect. For many years the museum has made an effort to use a museum data bank not only to list all of its holdings but also to catalog them in an academically meaningful way³⁶. The latter includes an accurate identification and assignment of keywords as well as a description of the historical function and current interpretation of the particular object. Special items receive a more intensive analysis in order to give them as complete an interpretation as possible and later to use them as germinal ideas for exhibition plans. These pieces of evidence are placed at the center of more careful examination and the question is asked how these objects can be read, analyzed and interpreted. At first the mere surface of an item is examined in an attempt to register all details that can be gained by the researcher's eye. On the basis of this concentrated and reflective perception, concrete, open and perhaps even sometimes outlandish questions can be posed in order to make – of necessity usually preliminary – conclusions possible³⁷. At this stage, standard primary and secondary texts that dominate everyday academic life come into play that frequently favor or confirm interpretations that seem “to fit”.

Research based on the careful study of objects does of course lead relatively quickly to texts. The use of these texts is essential for the reconstruction of the chosen contexts. However, the “naked” object remains the focus, from which all questions have their beginning and to which all observations can always be reconnected. The horizons, the contexts, the discourses that can be spun and found in this way, sort of like an epistemic spiral, make the thing into an anchor for independent research on objects in the history of medicine and science. The texts that result from this first analysis, although incomplete and yet still meaningful, form their own category of text with a particular significance. In their incompleteness and associative fragmentation they can be described as a sort of science feature or object feature³⁸. They offer valuable collections of clues for an unusual visualization that perhaps opens up a new perspective on more complex issues and delivers points of approach for the development of new theses that can finally also be published in a scholarly exhibition.

6. Self-Image and Perspective

The Berlin Museum of Medical History at the Charité makes it possible for visitors to the new permanent exhibition to take a look behind the scenes of science is legitimized by practice and is still perceived by many people today as hermetic and exclusive. In the specially constructed rooms characteristic ideas, models and approaches to treatment can be visually experienced that are associated with essential and existential moments of being and remaining healthy, as well as of illness. At the same time, medicine is shown as a central practice of culture in its institutional, urban and social context. It appears in many ways embedded in its relation to everyday life, mentality, religion and social and political life³⁹.

Since the permanent exhibition has opened, there has been a storm of interest in the Berlin Museum of Medical History at the Charité. At this point there are approximately 80,000 visitors per year, and

the trend is rising. Laypeople without medical knowledge make up the large majority of the individual visitors. Increasingly, families are finding their way into the exhibition. Children between 10-12 years of age show an amazing openness for the objects and subjects presented. The presentation of these objects, some of which evoke very strong emotional reactions⁴⁰, even appears to have the function of encouraging specific scientific and medical leanings and interests in this early phase of life. Currently, the museum is making efforts to see how the contents of the permanent exhibition can best be shown to this age group.

Most of the numerous groups that visit the museum are composed of students in higher secondary grades, primarily 10th–13th years. For them, the museum not only offers insights into the history of culture and science, but also the possibility to look more closely at the human body in its organic composition. Especially with this age group, the exhibition serves as an excellent medium with which to encourage a choice of career. In addition, the young people can be encouraged to consider the numerous medical, historical and ethical aspects of disease, death and dying in direct confrontation with numerous real human specimens.

The triad of professional orientation, communication of basic medical knowledge and an introduction to a more intense consideration of medical historical and ethical subjects serves as the primary motivation for a visit to the museum for the numerous members of various medical professions. Sometimes teachers from nursing schools and institutes for physical therapy, ergotherapy, speech therapy and geriatrics incorporate a visit to the museum in their teaching plan. University professors also frequent the museum to offer units in their courses in the framework of the medical, theoretical or ethical curriculum. Whole semester-long seminars have also been held in the museum ⁴¹. In this way, the museum is used not only by the general public, but also expressly by the medical

profession for its own educational purposes. In addition, the questions from professors in the social sciences and humanities are also on the increase. The new permanent collection appears to be highly attractive for seminars on an extremely wide variety of aspects of the scholarly treatment of the human body, on the history of medicine and medical collecting. Usually, students are offered an extensive academic tour in order to carry on a guided discussion afterwards about what has been seen and the associated contents and intentions.

7. Conclusion

The Berlin Museum of Medical History at the Charité has a broad and differentiated impact on the general public through its new permanent exhibition “Tracing Life”. It also affects the professional public and receives a unique, highly significant profile. The decidedly academic approach in respect to the historical use of the objects and their analysis as well as in relation to an accented thesis oriented concept of object-centered exhibitions appear to be essential for the certifiably large resonance⁴². Furthermore, the experiences gathered so far with the new permanent exhibition show the value of the conscious use of the history of the museum building, its architecture and the connection to the medical-topographical context of the museum – the hospital grounds of the Charité as well as the rich tradition of Berlin medicine.

Seen in this way, in respect to the whole field of the history of medicine, I can only argue for a highly differentiated museum landscape of collecting and exhibiting that deduces its specific thematic profile from an analysis of the local conditions and sharpens their contours. A larger number of pertinent institutions can thus be imagined for Europe and beyond, whereby each one elaborates for itself several central facets in the development of the medical complex. Together, the various institutions would make possible a comprehensive haptic-spatial synthesis of the history of medicine.

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34. SCHNALKE T., *Auf Leben und Tod. Ausstellen im Berliner Medizinhistorischen Museum der Charité*. In: HERMANNSTÄDTER A., SONNABEND M., WEBER C. (eds.), *Wissenschaft kommunizieren. Die Rolle der Universitäten*. Essen, 2008, pp. 58-61.
35. See SCHNALKE T. (ref. 33).
36. NITSCHKE C., *Die Präparate mit angeborenen Herzfehlern des Berliner Medizinhistorischen Museums – Bestand und Bedeutung*. Diss. med. Berlin, 2007.
37. SCHNALKE T., *Spuren im Gesicht. Eine Augenmoulage aus Berlin*. In: BOGUSCH, G., SCHNALKE, T. (eds.), *Das Besondere Objekt. Bemerkenswerte Gegenstände aus den historischen Sammlungen der Charité*. Münster, 2009 (in print).
38. SCHNALKE T., *Stumme Gesänge. Zur Geschichte einer Sirene im Berliner Medizinhistorischen Museum*. In: DOTZLER B., SCHMIDGEN H., WEBER C. (eds.), *Parasiten und Sirenen: Zwei Zwischenräume*. Berlin, 2004, pp. 87-101.
39. DIECKMANN C., *In der Krankenstadt. Auf Visite in der Berliner Charité*. Zeit Geschichte 2008; 2: 78-85.
40. See SCHNALKE T. ref. 18.
41. According to the medical curriculum, obligatory and voluntary seminars take place in the museum. The displays are used as teaching cabinets. Sometimes students develop and realize a special exhibition for the museum: SCHNALKE T. (ed.), *Porträt der Krankheit. Fotografien aus einem Krankenhaus in Südafrika*. Berlin, 2003; ATZL I., HESS V., SCHNALKE T. (eds.), *Zeitzeugen Charité. Arbeitswelten der Psychiatrischen und Nervenlinik 1940-1999*. Münster, 2005.

42. See the extraordinary resonance on the special exhibition on pain in 2007:
BLUME E., HÜRLIMANN A., SCHNALKE T., TYRADELLIS D., SCHMERZ.
Kunst + Wissenschaft. Köln 2007.

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