«Settant'anni sì, ma portati bene. L'età dell'Istituto Superiore di Sanità, trascorsa al servizio della salute dei cittadini e delle istituzioni, non ha invecchiato il suo spirito né la sua forza produttiva.

Oggi come ieri l'Istituto è ancora luogo dove si fa ricerca d'eccellenza, destinata al bene e alla salute di tutti».

Dall'Introduzione di Enrico Garaci

ISTITUTO SUPERIORE DI SANITÀ
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Research for the benefit of all

1934-2004

ISTITUTO SUPERIORE DI SANITÀ
2004

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Research for public health

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Foreword

As a haematologist who has both undertaken research and spent many years in hospital corridors and at the bedsides of patients, ministering to their hopes and desires, research that is planned and directed towards a clinical application is naturally close to my heart. This subtle thread leads from the laboratories directly to the suffering and needs of the patients and links me in a special way to the Italian National Institute of Health (Istituto Superiore di Sanità, ISS) and to all research pursued in the National Health Service.

In the three years of my ministerial mandate this thread has been woven into a fabric of projects and programmes designed to safeguard the nation's health; their implementation has drawn on the skills and on the technical and scientific support that is the Institute's heritage, the more precious for being placed at the service of the citizens.

During these years we have worked together, foremost in Europe, to study the results of some of the key treatments provided by Italian hospitals, with the aim of promoting the quality of health; we have cooperated in such important fields as oncology, infectious diseases, the fight against poverty-related and cardiovascular diseases and improving lifestyles.

In exercising my role as guardian of the nation's health, I have thus been able to count on a valuable ally, the ISS, which has always been generous in its efforts and willingness to perform all the tasks assigned to it. My choice of the Institute as a privileged associate has therefore been an easy one in the most varied circumstances: from health emergencies to national and international research projects.

This is why I am particularly happy to be celebrating the first seventy years of this Institute that has succeeded in making the most of its experience and of the wealth of wisdom generated by decades of working to improve the health of the entire community, while at the same time remaining young through the cutting-edge research that is its window on the future.

Girolamo Sirchia
Minister of Health

Introduction

Seventy years old - but it does not show. The decades that the National Institute of Health has spent serving the nation's health and institutions have not aged either its spirit or its productive energy.

Ever since its foundation in 1934 the Institute has been a centre of first-rate research and a reference point for the health and well-being of the nation.

Many years have gone by since Ernst Boris Chain (Nobel Prize-winner in 1945) studied the metabolism of carbohydrates and the mechanisms of insulin in the Institute's laboratories, or since the future of anaesthesiology was changed by the studies on curare led by Daniel Bovet, the other Nobel Prize-winner whom the Institute had the honour of hosting; but the same superlative research aimed at discovering new cures or improving old ones is still at the centre of the Institute's activities.

Yesterday's stage was set for the perfecting of the fermenters that the Institute produced in the sixties to manufacture penicillin; for the study of the mechanisms of action of molecules and their synthesis; the search for substances to combat the vectors of malaria and for programmes to eliminate the disease; for controlling the effects of radium – all in a confluence of research and service as old as the Institute itself.

Today the spotlight is instead on biomedicine: seventy years on the centre of the stage is occupied by stem cell research, the preparation of vaccines against old and new viruses, the search for drugs based on individual genetic profiles. These studies form part of national and international research projects, evidence that the Institute is still youthful in its ability to perceive future trends, to pursue the most promising scientific developments and to embark on research projects that can change our destinies.

And it is precisely this aspect of the Institute that has changed least, the spirit that has guided its activities through seventy years: the pursuit of research that can be applied to clinical use, that can create new therapies and diagnostic techniques. It is this spirit that has remained constant, even surviving the transformation of the Institute into an autonomous research centre and the consequent changes in its economic and administrative structure.

For while today's Institute has welcomed the latest forms of scientific partnership with private enterprise for the pursuit of such significant projects as the development of a vaccine against HIV/AIDS or the study of resistance to antibiotics, the spirit that animates its resear-

ch activities has not changed. The ultimate aim of research is always something that will bring a new form of treatment or diagnostic technique; not mere basic research or studies to be confined to an ivory tower.

These studies are now flanked by research into the quality of the outcomes of different treatments, in order to identify the centres that offer the best results and how they achieve this, as part of the drive to improve the entire health system. The goal of these newly-created and innovative epidemiological studies is the same as that of seventy years ago: to monitor the National Health Service and safeguard the nation's health.

This mission and a passion for research that is of clinical use have focused attention on studies in fields such as tumours and infectious, rare and poverty-related diseases, which are being undertaken in cooperation with US National Institutes of Health. This cooperation agreement - the first of its kind in Europe - is one of the most significant developments in the Institute's recent history and aims to carry forward some of the world's most advanced and promising research programmes.

The agreement is further witness to the many fields in which the Institute has a wealth of know-how and experience: from epidemiology to physics, medicine, virology, bacteriology, toxicology - all gathered under a single roof and all placed at the service of the public.

The Institute's past history and its present both offer practical examples of research that belongs to the community: the past success of the 1947 programme to eliminate malaria from Italy and the production by the Institute of methods to ferment penicillin and, today, the preparation of diagnostic tests for SARS and anthrax poisoning and the ongoing trials with vaccines against tumours and HIV / AIDS.

These examples show that developments in the laboratory concern us all, as individuals and as a nation. As individuals because they concern our hope that tomorrow a particular disease will be overcome, and as a nation because the role of each nation on the world stage depends largely on increasing its wealth of know-how and new ideas. By placing a high value on research we elect to foster the growth of knowledge rather than simply to exploit the new ideas generated by others, to be the leading players on today's stage rather than mere walk-ons.

Enrico Garaci
President of the National Institute of Health

The ISS building and its history in photographs

The Istituto di Sanità Pubblica (Institute of Public Health) as it was then known was officially inaugurated on 21 April 1934.

Works on the main building had begun on 6 July 1931, following the design of the well-known architect Giuseppe Amendola. The inauguration ceremony was attended not only by the head of the Government and other leading Italian figures of the time, but also by representatives of the Rockefeller Foundation, who financed the building of the Institute, and the Ambassador of the United States of America.

The area chosen as the site for the Institute was particularly suitable, being both in the centre of the city and close to the "Policlinico" hospital complex. The plan included ample open spaces surrounding the main building, to be laid out as gardens, and an even larger area on the other side of via del Castro Laurenziano that would permit future growth.

The excavations for the central building, 1931

The provision of room for expansion proved an extremely happy decision as the Institute's activities began to multiply at once. The need for additional smaller buildings on some of these areas was soon apparent. As the main building was designed to house the research laboratories, the new buildings were used to house the animals, premises for the production and packaging of sera and vaccines and, later, all the other accessory activities that accompany research such as administrative offices, the central library, stores and workshops. A network of underground passages was created to link the various buildings and has since proved extremely useful for moving persons and material around an institution in which more than 2000 people now work.

The fifties saw an expansion of the topics covered by the Italian public health system, partly in connection with specific emergencies, which necessitated the addition of new activities of

Work in progress, September 1933

The main entrance, 1938

The main entrance, 2004

The entrance to the new building in via Giano della Bella, 2004

research, surveillance and control to those already performed by the Institute. More laboratories were built and staffed with steadily increasing numbers of researchers and technical and administrative personnel. By 1982 the original four laboratories established in 1934 had become twenty-one and further buildings were needed. Rather than build on the entire area that had not been used originally, an ample space was left for the gardens, which still survive. In this corner of urban tranquillity, hedges and paths wind between varied species of plants, sculptures and a large fountain.

The original main building and the annexes were nonetheless unable to keep pace over the years with the Institute's expansion. The recent re-organisation into Departments, National Centres and Technical-scientific Services has given the Institute's numerous activities a more homogeneous and functional structure and the purchase of an ample building in the adjacent via Giano della Bella has at least partially solved the problem of space. The new building, which houses a number of key offices, was inaugurated on 20 February 2004.

The Nobel Prize-winners

A number of Nobel Prize-winners has cooperated
with the ISS in various ways,
including Enrico Fermi and Rita Levi-Montalcini.
Here we recall two who were on the staff of the Institute.

Ernst Boris Chain

1906-1979

Ernst Boris Chain was born in Berlin in 1906 into a family of industrial chemists. After graduating in chemistry in 1930 he spent three years researching enzymes at the Charité hospital in Berlin. In 1933, with the rise of Nazism, he emigrated to Great Britain and studied phospholipids at Cambridge University's School of Biochemistry before being invited to the Sir William Dunn School of Pathology in Oxford, where he became lecturer in chemical pathology in 1936.

Ernst Boris Chain
meets the British Ambassador,
1956

It was during this period time that, spurred by the need to perfect anti-infection agents, Chain discovered that some natural substances are efficient antibacterial agents. Together with the Australian Howard Florey he began a systematic investigation of these substances, particularly penicillin, which had been discovered some years before by Alexander Fleming. Chain succeeded in producing a pure form of penicillin and in applying it for medical use. Chain and Florey's work, which was first published in 1940, earned them the 1945 Nobel Prize for Medicine or Physiology, together with Fleming.

In 1948 Domenico Marotta, then Director of the National Institute of Health (ISS), offered Chain - whose non-Italian nationality disqualified him as director of an official ISS laboratory - a special contract and placed him at the head of the International Centre for Microbiological Chemistry. Chain directed his attentions to two distinct fields: biochemical research focusing on the metabolism of carbohydrates and the mechanism of action of insulin on the one hand and, on the other, improving fermenting techniques for the production of antibiotics and other substances of medical importance, with particular emphasis on penicillin. Both tasks were facilitated by the wide range of scientific and technical know-how available at the Institute.

In 1961 Chain returned to London to become Professor of Biochemistry at the Imperial College. He was awarded the Paul Ehrlich Prize in 1954, the London Society of Apothecaries' Gold Medal in 1957 and the Italian Chemistry Society's Marotta Medal in 1962, as well as a dozen or so honorary doctorates from European and American universities.

Daniel Bovet

1907-1992

Daniel Bovet was born in Neuchâtel (Switzerland) in 1907 and graduated in Biology at the University of Geneva in 1927 with a dissertation on zoology and comparative anatomy. He began working immediately with the Pasteur Institute in Paris, first as an assistant and later as head of the Laboratory of Therapeutic Chemistry, where he met Filomena Nitti, sister of the bacteriologist Federico, who was to become not only his wife but also a close colleague. It was during this period that Bovet, together with Fourneau, Tréfouel and Nitti, began to investigate the potential of sulphonamides, first on experimental models and later clinically, demonstrating that the antibacterial action of these agents is due to the sulphonamidic fraction of the molecule contained in Prontosil, the well-known antibacterial agent previously perfected in a German industrial laboratory.

Daniel Bovet
meets the Queen of Belgium,
1956

In 1947 Domenico Marotta invited him to Rome to organise the Laboratory of Therapeutic Chemistry at the National Institute of Health, where he continued the research he had started in Geneva on the synthesis of antihistamines and curare and curare-like drugs as blockers of another neuro-transmitter, acetylcholine. In 1957 he was awarded the Nobel Prize for Medicine or Physiology, in recognition of the importance of his work.

Between 1964 and 1969 he taught Pharmacology at the university of Sassari, later returning to Rome as Director of the National Research Council's Laboratory of Psychobiology and Psychopharmacology. He taught psychobiology at the University of Rome between 1971 and 1982.

Research excellence
for public health

Seventy years after its foundation, the principal goal of the newly re-organised ISS is to translate research into clinical results and support the activities and objectives of the Italian National Health Service (Servizio Sanitario Nazionale, SSN). The recently-acquired administrative and organisational autonomy and seventy years of tradition have changed the Institute, but it is still the technical and scientific body of the SSN and is now expanding its range of joint projects to reach beyond the SSN network and to include private research institutions. Many of the new studies being pursued in the Institute are financed through funds provided jointly by the Ministry of Health and private institutions interested in developing applications for the research.

But the fabric of the Institute is woven from two threads that bind the pursuit of scientific knowledge to the protection of the nation's health through research that can be applied at the patient's bedside and through evaluation and monitoring activities aimed also at preventing diseases. To this mission the Ministry of Health has recently added studies to assess the outcomes of treatment as a basis for guiding and stimulating the quality of health services.

The Institute's activities today are thus both numerous and varied, divided among seven Departments and two National Centres that together address every area of health, from biomedical to environmental and epidemiological aspects.

This dedication to science, which has always been pursued through international joint projects, has in the last year seen the publication of more than one thousand works in reviews such as *The Lancet*, *The New England Journal of Medicine* and *Science*. The Institute's record of excellence in a variety of scientific fields has recently taken the form of an agreement for scientific cooperation with the US National Institutes of Health (NIH), the first of its kind between the NIH and a European partner.

The Institute forms part of a major network of national and international cooperation schemes, contacts, exchanges and projects, not infrequently as either coordinator or supervisor. The common goal is to combine increased knowledge and protection of the health of the community.

The fight against AIDS

One of the areas in which the Institute excels is research on AIDS, which has been financed and coordinated throughout Italy since 1988 through the National AIDS Research Programme promoted by the Ministry of Health. In cooperation with major Italian health centres, the Institute is conducting trials of a vaccine based on the TAT protein that the ISS researchers have shown to inhibit replication of the virus in monkeys. Advanced clinical trials are also in progress on the use of new antiretroviral drugs and identification of their most effective and safe combination. Research on drugs has produced important results in understanding the mechanisms of HIV transmission from mother to child.

Cancer research

One of the Institute's most recent research projects concerns serum proteomics, which it is hoped will permit earlier and more precise diagnoses. This line of research, which the ISS is conducting in cooperation with key cancer centres in Italy, is based on an analysis of patients' serum and the identification of serum proteomic patterns that are specific for particular forms of cancer, thus enabling tumours to be diagnosed in the initial stages. Other studies aim to identify specific phospholipids of tumour cells, as potential targets of molecular therapy. As part of the drive to produce new drugs, studies are being carried out on microRNA genes, which suppress gene expression and in some cancers act as tumour-suppressors. It is hoped that these studies may lead to the development of a new family of less toxic molecular anti-cancer drugs. These studies are the result of an agreement signed in March 2003 between Italy's Minister of Health, Girolamo Sirchia, and the US Secretary of the Department of Health and Human Services, Tommy G. Thompson, and represent one of the advanced areas of cancer research that are most promising in terms of short-term results.

Another important chapter in the fight against cancer concerns Italian and European clinical trials of vaccines to cure and prevent cancer, which are being coordinated by the Institute. These involve agents able to generate an effective immune response against either existing tumour cells or the viruses involved in the onset of some types of cancer. The Institute has patented a procedure for the use of dendritic cells, which are able to trigger an immune response and which could therefore be used as therapeutic vaccinations for cancer patients.

Stem cell research

At the cutting-edge of medicine the Institute is coordinating research on stem cells being carried out not only at the ISS but also by groups of leading Italian researchers. The programme includes clinical and pre-clinical trials and focuses on the study of postnatal and adult stem cells. The aim is to regenerate tissues that have been irreversibly damaged by serious pathologies such as neurodegenerative diseases or coronary heart diseases.

The fight against infectious diseases

More than fifty new infectious agents have been discovered over the last forty years and other, more classical, agents have been involved in serious emergencies such as the spread of the AIDS epidemic, malaria and tuberculosis.

Research conducted at the Institute in this area features the preparation of vaccines and therapies to fight these infections. Thanks to sophisticated biotechnological procedures, excellent results have been achieved in the use of protease inhibitors and human antibodies that are much more efficient than their precursors in curing pathologies such as candidosis or Kaposi's

sarcoma that exploit the susceptibility of HIV-positive individuals. Progress is also being made in the fight against more recent infectious agents such as SARS and avian influenza, as well as other agents that could be used by terrorists, where the emphasis is on the rapid diagnosis of these pathogens. The Institute has perfected advanced molecular biology techniques to diagnose anthrax, SARS and smallpox in between two and six hours. In the drive to identify the best possible strategies for the prevention of infectious diseases, the Institute and the Ministry of Health are engaged in a joint study of the impact on public health of pathogen resistance to commonly-used antibiotics. The ultimate aim of this project, in which numerous health centres are involved, is to define a map of the major infectious pathologies present in Italy together with data on the incidence of pathogenic agents and their sensitivity and resistance to antibiotics.

Creutzfeldt-Jakob disease

One of the more recent health emergencies concerns Creutzfeldt-Jakob Disease (CJD) and its new variant, and the Institute is conducting research to characterise the different viral strains of bovine spongiform encephalopathies, which cause the human pathology. It has published numerous papers on this topic in international reviews, both on the mechanisms that regulate the causes and onset of CJD and its variant and on mechanisms to inactivate prions. Among the achievements in this area is a patent for a diagnostic test to inactivate prions in precooked foods.

Assessing the quality of healthcare

With the aim of evaluating the quality of some of the forms of treatment offered in healthcare centres throughout Italy, the Ministry of Health has assigned to the Institute the task of assessing the outcomes of certain treatment regimens in public structures adhering voluntarily to the scheme. This benchmarking procedure is intended to stimulate improvements in all health centres by comparing results, which will initially be communicated to operators in the health sector and, later, to the public. Among the first to be monitored were 98 heart surgery centres, in which the outcomes of coronary by-pass procedures were studied. This was followed by the monitoring of results of hip arthroplasty and radiotherapy in breast cancer.

Epidemiological networks

The ISS manages Italy's largest and most important epidemiological network. This involves studies to characterise viruses and bacteria such as those that cause influenza or meningitis, as well as the mechanisms to inhibit them and the related diagnostic tests; infectious diseases are also monitored, including new diseases or others that make a comeback, thereby creating a privileged position from which to orient health policy towards the most effective preventive strategies. One example of these excellent surveillance networks is the AIDS Operational Centre,

which was established at the beginning of the AIDS emergency and each year maps the spread of the virus throughout Italy. Another more recent example is the Creutzfeldt-Jakob Disease Register, in which new cases and deaths due to this pathology are registered; there is also a Register of rare diseases, which not only provides data on the incidence of low-prevalence pathologies, but is also a useful social and healthcare instrument for assessing the care needs associated with diseases that can be extremely difficult to manage because of our scant experience of them.

Important epidemiological studies have also been conducted in the field of environmental risk factors as a means of promoting safety in the workplace. These include studies on correlations between the onset of cancer and exposure to asbestos or to electromagnetic sources.

The Institute has also established two Risk Charts, one for cardiovascular and one for respiratory tract diseases: these are intended to calculate the possibility of an individual contracting any of these pathologies on the basis of lifestyle and personal risk factors.

The Institute is also extremely active in the fight against smoking, drug abuse and alcoholism, offering scientific advice for campaigns to promote a healthy lifestyle and support and guidance in the fight against alcohol abuse and smoking. An epidemiological observatory and studies on the effects of these substances and their abuse are part of the strategy to address these problems.

Food safety and environment

The safety of the food we eat and of the environment is another major field in the Institute's activities and includes studies and monitoring of the quality of air, water and soil.

In the drive to improve safety levels the Institute monitors water for drinking and for bathing as well as mineral water: it also studies the most effective and sensitive methods to detect toxic substances, bacteria or viruses in the sea, lakes, rivers and in water used in the production of food.

Also within the framework of efforts to prevent environmental hazards, studies are conducted regarding substances present in the air and in the soil, as well as in the home – the so-called indoor pollution - in order to understand possible links with the onset of particular pathologies, particularly those associated with reproduction.

International activities

The Institute's tradition of cooperating with international organisations dates from its very beginning and the Rockefeller Foundation's support in the fight against malaria.

Among the Institute's many international activities are its participation in the drawing up of bilateral protocols for the Italian Government, to which it brings methodological know-how

as well as technical and scientific proposals, and the promotion and implementation of projects financed both by multilateral organisations such as the World Bank, the European Union, the World Health Organization (WHO), UNICEF and Regional Development Banks and by the Italian Government (Ministry for Foreign Affairs, MAE) in countries with which the Italian Government has special relationships. These international activities also include the training of managerial and executive personnel financed by the MAE and a significant participation in WHO, of which the Institute hosts some collaborative Centers.

Another area in which the Institute is active and which further enhances its international status is its support to the Italian science attachés, assisting in the planning and implementation of scientific and educational initiatives in various countries. Protocols have been agreed with the United Kingdom and other EU member states, Australia, China, Japan, Israel, South Africa, Argentina, Russia, Kazakhstan, Albania and Serbia; financing is provided jointly by the MAE and the countries concerned.

Together with the National Health Service and within the framework of health service reform and structural adjustment proposed by the United Nations and other international organisations, the Institute promotes initiatives in the fields of technical assistance, research, training in health and biomedical studies, the development of social and health policies and services, environmental reclamation and protection, support for community micro-development schemes and the self-sufficiency of public healthcare centres.

Each of these fields is considered as being interdependent; the technical, technological and organisational projects they generate, together with the research and training, underpin international programmes in which applied research, the development of health systems and the fight against diseases are viewed in terms of their application by the intermediate or nation-wide services and structures needed to support and qualify them.

The NIH-ISS agreement

The agreement between the US National Institutes of Health (NIH) and the ISS deserves a special mention on account of the extraordinary and peculiar nature of the cooperation it embodies. For the ISS the agreement is a significant landmark, as it is the first time that such an agreement is financed jointly by both countries. It covers such issues as the study of degenerative and infectious diseases and women's health, and sets aside part of the resources for the creation of partnerships in third countries, where the aim is to reduce inequalities in health treatment at the global level. The agreement not only makes the best possible use of skills in which each partner excels but also creates new forms of synergy. The possibility for researchers to move between centres and to exchange know-how, which is an integral part of the agreement, creates a new and important network for the advancement of knowledge and represents a significant and systematic investment in new talents made possible by a common vision of research policies.

Testimonials

Ugo Amaldi

Conseil Européen pour la Recherche Nucléaire - CERN, Ginevra (Svizzera)

Professor Ugo Amaldi, you were familiar with the Institute in its early years; what do you recall of those days?

I first entered the Institute in 1957: Professor Mario Ageno, who had not yet become Head of the Laboratory, asked if I would be interested, after taking my degree, in accepting a grant and maybe pursuing a career in the Physics Laboratory. I had almost finished my degree and was well aware that, as the son of a physicist who was well known both in Italy and abroad, if I were to enter an institute in which he had influence I would find it hard to prove my own abilities as a researcher – to myself, above all. Edoardo Amaldi had also worked for the Institute and, as you know, immediately before the War had, together with Enrico Fermi and Franco Rasetti, designed and built the first Italian accelerator. At the time he was not working in any capacity with the Institute, although he was a good friend of Giulio Cesare Trabacchi, then the Head of the Physics Laboratory, who in his role as "Divine Providence" had supplied the source of radon that enabled Fermi and the other so-called "boys of via Panisperna" to discover neutron-induced radioactivity in the thirties.

Having decided to pursue a career in research at the Institute of Health I went to inform Ageno of my decision, before I had even completed my degree. I can still remember my first descent of that magnificent marble stairway and my astonishment at the incredible cleanliness that reigned everywhere. The Director, Domenico Marotta, was a stickler for detail; all the researchers wore white coats, including the physicists who were used to wearing mechanics' grey overalls at the University's Institute of Physics.

When I entered the Institute Mario Ageno and Ruggero Querzoli were working on the injector for the Frascati synchrotron, which became operational in 1959. I was charged with designing and building two magnetic quadrupoles to focus the electron beam and inject it into the ring of the accelerator. For one or two months I was completely at sea, but it was there that my passion for the scientific and medical use of particle accelerators was born.

In those days young researchers like myself saw the Institute's activities essentially as basic research which, in laboratories such as ours, was centred on nuclear and subnuclear physics. There were, too, the tasks that we called "checks", or institutional activities, but relatively little time was spent calculating shields for betatrons and cobalt bombs, or protecting the population who lived near nuclear plants or offering technical advice to the men in the Ministry who were drawing up the early laws to regulate ionising radiation. Marotta and Ageno wanted us to do

scientific research, in the belief that those who only worked on the checks would lose touch with the advanced knowledge that nurtures basic science and would soon be unable to tackle even the latest institutional tasks.

Would you like to recount a particular episode?
I still have a vivid memory of the "cellar", which housed the workshop – as well as the famous gramme of radium that enabled the "boys of via Panisperna" to make their discovery – where there was also a very powerful magnet. During a discussion between Ageno and De Benedetti, an Italian nuclear physicist who had emigrated to the States, it was decided to use this magnet as the core of a new and highly innovative instrument. I was given the job of overseeing the construction of this gamma-ray polarimeter, of making the measurements and analysing them. The project was very exciting: the confirmation – in a particular type of nuclear decay – of the hypothesis of "non-conservation of parity", which later earned a Nobel Prize for Lee and Yang, the two Chinese-American theorists. We were not the first, but after the usual months of problems and discouragement, the experiment succeeded. When the time came to announce the results, I held my first seminar in the Institute and Marotta himself attended it.

Did you feel encouraged by Professor Marotta?
I had seen him only a few times prior to the seminar, mostly in the corridors of the Institute. He was very imposing and, notwithstanding his many commitments, kept a close watch on all key proceedings, and on the affairs of our laboratory in particular.
I remember well how, immediately after the seminar, Marotta came up to me and, after offering his congratulations, kindly but firmly corrected me: at a certain point of my talk I had said that "people think that this theory …". He hadn't liked my use of the colloquial term 'people'. "Amaldi," he said, "we don't talk about people, we talk about the scientific community".

In your opinion, is there still a direct link between the mission of yesterday's Institute and today's?
I have not worked at the Institute for many years and am no longer a member of the Scientific Committee, but I do speak often with other physicists, many of whom are close friends. Despite my long absence I have continued to take an interest in the Institute and even put forward a proposal, which was taken up by Martino Grandolfo and colleagues, to team up with ENEA (Italian National Agency for New Technologies, Energy and the Environment) to build a new type of accelerator for proton therapy for deep tumours. Sadly, work on building the "TOP", the linear accelerator for proton oncological therapy, has not yet begun.
Generally speaking, it is my impression that the need for extreme scientific precision and the sense of statehood that Marotta and Ageno gave to the Institute and the Laboratory, are less strongly felt today than they were then.

How would you describe today's Institute to someone who does not know it?
I should first of all like to point out that the name Institute "di Sanità" sounds funny to non-Italians, because the Italian word "sanità" sounds closer to the English word "sanitation"

(which has quite a different meaning) than to health. Another aspect that strikes non-Italian physicists is that the Institute's researchers have pursued – and continue to pursue – important basic research (and here I like to cite the famous theoretical physicist Luciano Maiani, who began his professional life in the Institute and was recently Director of CERN) while at the same time dealing with highly practical matters such as measures to protect the population and the use of radiation and radiobiology in cancer therapy. This dual role is virtually unique in the international setting; physicists who engage in basic research do not usually have any direct part in monitoring a nation's health.

What advice would you give today's young researchers?
Although I do not know the young people working at the Institute today, I would give them the same advice I give to young people in universities and research institutes: work hard on the scientific problem that interests you and, without interrupting your work, protest about how disgraceful it is that in Italy a person starting out on a career as a researcher should be so poorly paid and should encounter so many obstacles when attempting to finance even high-level research projects. It is a disgrace that everybody, from the President of the Republic to the members of the Government and of Parliament, continues to repeat that more money should be invested in research because the future of advanced societies lies in research, and then nothing happens: investment in development research has languished at 1% of GDP for decades. When we were young Marotta managed to ensure that the Institute received solid financing and attracted scientists of international fame. The Physics Laboratory had state-of-the-art equipment and, if anything, was lacking in researchers to make full use of it: even then there was a so-called "staffing" problem. Research also suffers from lack of space. In my opinion, for example, it was a serious mistake, in the sixties, when there was talk of a new site for the Institute, not to move to much larger premises with much more space and better chances of development.
I was directly involved in the collective movement of the Institute in 1969. I don't know why – because I had no ties with any political party – but I was elected vice-chairman of the Assembly, of which Professor Vella was chairman. I remember that Ageno was pleased with my appointment because he hoped it would bring an opportunity for change. We did manage, after many months of heated debate, to produce a reform bill that was later approved by Parliament. This placed the Institute's researchers on a pair with those working with universities. It was hoped to encourage a two-way flow of researchers, but unfortunately this injection of new life never came about.

How do you think the Institute's role is seen on the international stage?
I commute between Geneva and Milan, where I teach Medical Physics, and therefore know something of what goes on in the World Health Organization and in the medical research centres of northern Italy. I can say that the Institute has a good name for biomedical research. Otherwise, I only have direct knowledge of its activities in the field of Physics, which are well

thought of internationally. However, as I have already said, it is my impression that the young – who are the engine of every advanced research centre – have a hard time keeping their heads above water and that the means and the space available are not sufficient (despite recent acquisitions). This is a pity, because the Institute has the potential to expand in all directions. In essence I think it is almost a miracle that so much good scientific and technical work comes out of the Institute, notwithstanding the difficult circumstances.

Rita Levi-Montalcini

This year the Institute is celebrating seventy years of activity and we are gathering together the recollections of those who have made important contributions to scientific research: obviously, your own cannot be missing. I have read that you were invited to work with the Institute towards the end of the sixties by the then Director, Professor Marini Bettolo. What do you recall of that time?
I remember the late Professor Marini Bettolo with enormous gratitude and as a dear friend: he did everything possible to facilitate my scientific activities in the Institute. He had a basement especially converted into a proper laboratory for my research, so that full-time assistants could more easily be hired. From the beginning our relations were marked by mutual esteem and harmony.

Why did he ask you to work with the Institute?
He attended a talk I gave about the discovery of Nerve Growth Factor (NGF), which earned me the Nobel Prize in 1986.

At that time Professor Stanley Cohen was also working at the Institute…
Cohen and I had worked together in Saint-Louis. Marini Bettolo generously accepted my proposal that he should be a guest of the Italian Institute of Health. My experience with *in vitro* cultures made it possible to study the activity of Epidermal Growth Factor (EGF) *in vitro*. Cohen and I shared the honours in Stockholm for the discovery of EGF.

Do you have any particular memories of the Institute?
I have wonderful memories both of the high level of scientific skills and of the enthusiastic commitment of the young researchers, who were indifferent to receiving little or no economic reward, which I often provided out of my own pocket.

What do you see as the main differences between the Institute as it was then and as it is now?
It is difficult for me to judge today's Institute, it has changed so much; it is a research institute of considerable importance on the national and international scientific scene.

And what position do you think it occupies on the international scene?
Today's President, Professor Enrico Garaci, is directing research that has produced important and valulable contributions in various sectors of neurobiology and the activity of NGF on cells of the immune system, in particular.

We all know of your deep affection for the young. What advice can a Nobel Prize-winner who has been closely associated with our Institute give to young people who are today setting out on the road to a fascinating career in research?

I would advise them to believe in the values of research and to commit themselves to it totally, in the knowledge that scientific research can also offer important contributions on the social and cultural levels.

Carlo Croce

Director, Kimmel Cancer Center, Philadelphia (USA)

My first encounter with the Italian National Institute of Health (ISS) was in my third year of studying medicine. The meeting combined a bit of everything: it marked my first visit to a laboratory, the transition from studying books to performing experiments, but most of all it embodied the dreams of someone who was deciding to devote a lifetime to pursuing the promises of biomedical research. And the Institute certainly did not dampen the enthusiasm of young researchers: the atmosphere was positively magic. In the gardens one might run across Daniel Bovet or Ernst Boris Chain, the two Nobel Prize-winners who were guests of the Institute at the time, and there was a feeling of being at the heart of pioneering research work. One could see clearly the results soon to be achieved in the field of biomedicine and the atmosphere throughout had a European, an international flavour: something that is usually felt in the presence of first-class research.

Thirty years have gone by since then, and in a certain sense I am returning to the Institute from the US thanks to a pioneering international research project: still on the cutting-edge of research, just as before. And I have found the same desire to keep on working on the frontiers of science, the same high quality of some groups and sectors. Work has gone forward despite the obstacles to financing that obtain in a country like Italy, and extraordinary results have been achieved in fields such as AIDS, research on stem cells, proteomics. From afar I still think of Italian advanced research and ISS as an indissoluble duo.

The task of making the best use of the Italian research heritage, with which I naturally have very strong sentimental ties, will increasingly fall to institutions. At the Kimmel Cancer Center there are currently about fifty Italian researchers, some of whom have come from ISS - a significant indication of Italy's resources.

However, the date with the competition in scientific innovation cannot be postponed. Globalisation represents a major challenge in terms of competition. Today each country must decide how much it values research, how much to invest in it, and how to reward its brains and the institutions responsible for the pursuit of scientific knowledge.

Inevitably, this scale of values will decide the place each country assigns to its patrimony of knowledge: whether to import or produce scientific know-how, whether to create the intellectual medium to foster research development or to feed on the fruits produced by its neighbours.

Canova's Myologies

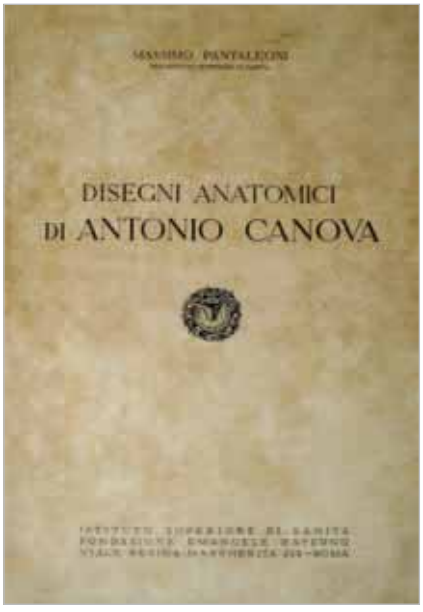
As part of the celebrations for the seventieth anniversary of foundation of the Institute, seventeen anatomical drawings by Antonio Canova, owned by the Institute Library, are being exhibited for the first time.

"Thus the stone re-worked ad infinitum *stands in relation to the inexhaustible vein of drawing as its mirror image; the former from its solemnity is re-humanized and becomes intimist, like the drawing which, raising itself to the zenith of academe, is stripped and shattered into a presumed informality, beyond which it is however at once regenerated as a superb stylism. The first, with its splendour glistening yet gradiated, almost nebulous, attracts and condenses the enfolding darkness and drives an immense breath into the ivory spectres of its mystical choreographies [...].*
The second, that is the drawing in its more typical and ideal guise of the graffito outline, rapidly sketched on a non-existent plane like a thickness of air or of a pond, profiles gracile ashen simulacra, extremely fragile stems tapered by the light which they adorn in the full sun or slowly circle, immaterial, like corollas of nocturnal smoke. Both of them signs of an incontrovertible alienation and together extraordinarily artful symptoms of an enormous passion for life"

Translation from
Gian Lorenzo Mellini, Il lapis di Canova (1983)

The myological studies by Antonio Canova, conserved in the Library of the Italian National Institute of Health, cannot be considered typical specimens of Canova's drawing style, which is characterized by that lightness and graphic immediacy that do however appear in Plate III, representing an anterior-lateral view of the trunk, where the anatomical detail seems to be animated in the posed figure, according to a *tòpos* of anatomical iconography which is above all of Leonardesque origin.

The series of the seventeen drawings (of which one is missing, as evinced from the key to the present Plate I: presumably a view of the head, perhaps frontal) is on the contrary typical of anatomical studies drawn from life that pertain to the artistic training of the great neoclassical artists and, in the light of the ongoing research which is reconstructing the puzzle of the history of Artistic Anatomy, constitute a background of knowledge requisite for all artists: in a systematic manner from the Renaissance on, and in an intermittent fashion already from the early Fourteenth Century.



"Disegni anatomici
di Antonio Canova"
(Anatomical drawings
by Antonio Canova)
by Massimo Pantaleoni (1949) -
Rome, Library of the Istituto Superiore
di Sanità (No. 1192 of 1200
copies printed)

They are therefore drawings in which the artistic purpose is intrinsic: that is, as Massimo Pantaleoni rightly wrote in the 1949 facsimile edition, this series by Canova *is neither an anatomical atlas, nor a scientist's* vademecum, *but rather an artist's memorandum*. Pantaleoni also underlines the *possible discord between the scientific and artistic points of view, even then at odds in the preparation and execution of works of art*, putting his finger on a sort of *punctum dolens* regarding this type of studies, frequently undertaking with unilateral intentions. If anatomy is certainly the most direct meeting ground between Art and Science, the points of conctact in which this exchange gradually proved more beneficial for both parties have still not been adequately brought into focus. A certain vagueness which persists in the contributions to the question also arises from the history of medicine, which has relegated the history of surgery, especially of the Medieval and Renaissance periods, to the sidelines as an inferior activity residing merely, to paraphrase the title of a recent book by Giorgio Cosmacini, *in the hands*. Artists and surgeons have, therefore, long suffered a shared allocation to the category of the so-called *practicals* – painting is, instead, *scienzia*, as made clear by Cennino Cennini and forcibly reiterated by Leonardo da Vinci – but, obviously, it is not that categorization which united them so much as the specific common interest in the study of the locomotory apparatus.

In the era of Mondino (the *Anothomia* by Mondino de' Liuzzi dates from 1316), when dissection proceeded according to the sequence of the three cavities (lower, or abdominal cavity, seat of the *membra naturalia*; middle, or thoracic cavity, seat of the *membra spiritualia*; upper, or head, seat of the *membra animata*), the earliest artistic evidence of anatomical precision does nevertheless show an interest in the morphology of the limbs and the upper part of the trunk (for example in Crucifixes and Deposition by the Veronese sculptor "Rigino di Enrico"). Later, it would be Leon Battista Alberti who pointed out the anatomical procedure that the artist needed to make his own: *it will be best first to set out each bone [...] then add its muscles, and then clothe it completely with its flesh*.

Leonardo, in his analytical study of the parts of the human body intended to the visualize the reconstruction of the entire corporeal organism, instituted fundamental methods and graphic inventions still in use today. For example, the description of the vertebrae (*You should make these bones of the neck from three aspects, joined together, and from three aspects separated. And you will do the same, then, from two other aspects, that is, seen from below and above. Thus you will give true knowledge of their shapes*), and the graphical simplification of the muscles illustrated *by using rows of threads*, that is in a yarn-like guise, in this way showing stratification and action. In the ponderous and extremely refined Leonardesque anatomical *corpus* we can also glimpse traces of an ordering of the subject, among which was the intention, unequivocally expressed, of composing treatises specifically for the use of surgeons and artists:

> *Different muscles are perceived in the differing movements of animals [in the broad meaning which includes humankind], and different muscles in such diversity of movement are hidden. It is necessary to make a long treatise on this subject for the purpose of knowing the places injuried by wounds, and further for the purposes of sculptors and painters, etc.*

Da Vinci further recommends describing *the distances interposed between nerves in depth as well as breadth and thus the proportions of their sizes and lengths and the difference between their heights and descents from their origins. You will do the same for muscles, veins and arteries; and this will be most useful to those who treat wounds* [*surgeons*].

Leonardo's intention of compiling treatises of anatomy for artists and for surgical anatomy came to fruition much later in the work of Bernardino Genga, *Doctor of Philosophy, Medicine and Professor of Anatomy and Surgery in the Ancient Hospital of Santo Spirito in Sassia in Rome*, as he is styled in the title-page of his treatise *Anatomia Chirurgica, cioè istoria anatomica dell'ossa e muscoli del corpo humano* (first edition, 1672). He was also the preparer for the drawings of cadavers for the French Academy in Rome, an activity which eventually produced the first treatise for artists uniting the studies of the human body conducted in an art academy with reference also to the anatomist: *Anatomia per uso et intelligenza del disegno ricercata non solo su gl'ossi, e muscoli del corpo humano, ma dimostrata ancora su le statue più insigni di Roma* [...] *per istudio della Regia Academia di Francia Pittura e Scultura sotto la Direzzione di Carlo Errard* [...] *preparata su'i cadaveri dal Dottor Bernardino Genga Regio Aantomico* (published in 1691, after the death of Genga, the index and commentary added by Giovanni Maria Lancisi).

Further evidence of the rapport between art and surgery may be gleaned from the biography of Vincenzo Camuccini, written by Carlo Falconieri:

> *And here I will note that right around that time [the years of his studies from antiquity], recognizing that without the study of anatomy there cannot be any worthwhile wisdom in drawing, he took pains to save his time in order to spend several hours a day going to the Santo Spirito hospital to draw the cadavers prepared by the surgeon's knife, without which training the painter and sculptor make vacillating figures, like buildings without foundations.*

Giuseppe Bossi, who would also do the drawings for his *myological series* in Rome at the Consolazione Hospital, after having returned to Milan and been nominated Secretary of the Brera Academy, made reference to an anatomist with artistic competence (able to back the acquisition by the Academy of the famous Ercole Lelli Collection) as one who knows well the external forms, warning that

> *the finest, less than to myology for drawing, albeit necessary, to the spleen, nerves etc. etc. tend to apply themselves to these which, more than the myologies, being very complicated and originating most of the diseases, form the object of a particular and very refined study in medical art: a study however that hardly investigates its component substances and internal structures while instead paying attention to the external forms, the only object of the drawing arts.*

This, then, is the historical circle within which the Canova's myologies find their appropriate context: the tradition of the French Academy in Rome, the splendid osteological and myological drawings made by Vincenzo Camuccini between 1786 and 1788, and those by his master,

Domenico Corvi, which have not yet come to light. These were followed by the *myological series* by Giuseppe Bossi in 1795 and 1796 and the later anatomical studies of other neo-classical masters: Odorico Politi, Luigi Sabatelli, Pietro Benvenuti, these last also still to be identified (some of the myological drawings assigned by the critics to Benvenuti have proved to be replicas or copies by Camuccini) but, from the biographical evidence, all produced during their formative years in Rome.

Compositionally, between the Michelangelesque sculptural emphasis of the painter Camuccini, already evident in the ancient statues *considered anatomically* in the Errard/Genga treatise, and the analytical view-by-view renderings by Bossi, the myological drawings of the sculptor Canova constitute a precedent for this second example in a more synthetic form, the Bossi series consisting of thirty-one plates. Like these, the Canova drawings show by sectors the entire human body according to the following subdivision, independently from the order which was given in the 1949 publication:

- a right anterior-lateral view of the neck;
- three views of the trunk: two right posterior-lateral, very similar except for the slightly different position of the arm; one left anterior-lateral with extension of the trunk and head and with arms raised;
- four views of the upper limb: left arm in lateral view (with a sketch of the forearm semi-flexed); full left limb in lateral view, with forearm semi-flexed and hand semi-prone; full left limb extended and with palm in view; full left limb with palm in view with arm in abduction by 90° on the trunk (with a drawing of the armpit area) and forearm semi-flexed on the arm;
- three views of the left thigh: anterior view in extension; medial view semi-flexed; extended posterior-lateral view with musculature of the gluteus;
- three views of left leg and foot: anterior view; lateral view; posterior view;
- two views of the hand: dorsal and palmar in a single Plate;
- two views of the foot: lateral view with toes in plantar flexion; view of the sole.

All the subcutaneous morphology is thus visualized and moreover accompanied by the autograph list entitled *Descrizione dei muscoli esteriori del corpo umano* (Description of the external muscles of the human body), where Canova noted for each muscle and in sequence from head to foot, name, action, origin and insertion.

Like the other myological drawings to which reference has been made, Canova's myologies are also drawn in two colours, with red pencil and black crayon in simulation of the fleshy conformations and of the tendon cords and extensions. A certain hardness in the execution, that has also given rise to the supposition of execution not from life, is rather to be interpreted, in my opinion, as an effort to reach an objective reproduction, even if with sometimes simplified results. The date and place of their realization have customarily been fixed within his Venetian period (Pantaleoni indicates, tentatively, the years between 1776 and

1779). However, as I have attempted to demostrate here, the methodology and typology of these sheets belong instead to the tradition of the studies that were conducted in Rome and they can well be inserted in the formative years of Canova's first stay there (1779-1780), in that extremely intense drawing activity carried out between the French Academy and that of San Luca at the Capitol, on the basis of the Antique, the Old Masters and nude models. The words of Leopoldo Cicognara would not appear to be in contrast with this hypothesis in that he leaves to posterity the judgement as to whether Canova actually did make those profound studies of nature and of anatomy that would be indispensable for such great creations.

In this sense the conservation of the Canova's myologies in this prestigious scientific Institution and their current exhibition are of considerable significance.

Paola Salvi, Chair of Artistic Anatomy, Brera Academy of Fine Arts, Milan

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Gian Lorenzo Mellini, *Il lapis di Canova*. In: *Canova disegni scelti e annotati da G.L.M*. Florence, 1984, again in «Labyrinthos», VI, 10, 1986 and in ID., *Canova. Saggi di filologia e di ermeneutica*. Milan, 1999.

The quotations from Leonardo da Vinci are from the *Corpus of Anatomical Studies in the Collection of Her Majesty the Queen at Windsor Castle*, by Kenneth Keele and Carlo Pedretti. London, 1979-1980, Italian Edition, 1984.

For the history of surgery:
Giorgio Cosmacini, *La vita nelle mani. Storia della chirurgia*. Roma-Bari, 2003.

Canova's anatomical drawings

Seventeen original anatomical drawings of the human body
by Antonio Canova are here reproduced
They are subdivided into:

Neck - one Plate (Plate I)
Trunk - three Plates (Plate II, III, IV)
Inferior extremities - eight Plates (Plate V, VI, VII, VIII, IX, X, XI, XII)
Superior extremities - five Plates (Plate XIII, XIV, XV, XVI, XVII)

Presumably a Plate showing the head and masticator muscles was drawn
by the artist but it is missing today. This is evinced from the numbering of the present Plate I.

The Plates include original captions by Massimo Pantaleoni's volume (1949).

Plate I - Neck Muscles

The artist illustrates the upper layer of the muscles of the neck seen from the right side.
Exhibits in the caption:
the pectoral (*M. pectoralis major*) 8;
the sternocleidomastoid (*M. sternocleidomastoideus*) 9;
the omohyoid (*M. omohyoideus*) 10;
the splenius (*M. spleniocapitis*) 11;
the levator scapulae (*M. levator scapulae*) 12;
the scalenus (*M. scalenus ventralis, M. scalenus medius, M. scalenus dorsalis*) 13;
the sternohyoid (*M. sternohyoideus*) 14;
the thyrohyoid (*M. thyreohyoideus*) 15;
the digastric (*M. digastricus*) 16;
the mylohyoid (*M. mylohyoideus*) 17;
This plate is completed by the *M. deltoide*, the *M. trapezio*
and the *M. massetere* in its insertion at the angle of the mandible.


10 Coracojoideo
11 Splenio
13 Scaleno
14 Sterno joideo
17 milojoideo

Plate II - Muscles of the trunk

Illustrated are the muscles of the back, upper layer with some adjoining muscles of the head, the neck and the abdomen seen from above and from the side.
The artist exhibits:
the trapezius (*M. trapezius*) 1;
the rhomboid major (*M. rhomboideus major*) 2;
the latissimus dorsi (*M. latissimus dorsi*) 3;
the teres major (*M. teres major*) 4;
the teres minor (*M. teres minor*) 5;
the infraspinatus (*M. infraspinatus*) 6;
the deltoid (*M. deltoides*) 7;
the *M. splenius*;
the *M. levator scapulae*, the scalenus muscles, the sternocleidomastoid, which appear in the drawing are not numbered.
The same can be said of the *M. serratus lateralis*, the *M. obliquus abdominis externus*, and that portion of the triceps (*caput longum*) which is hidden under the deltoid.

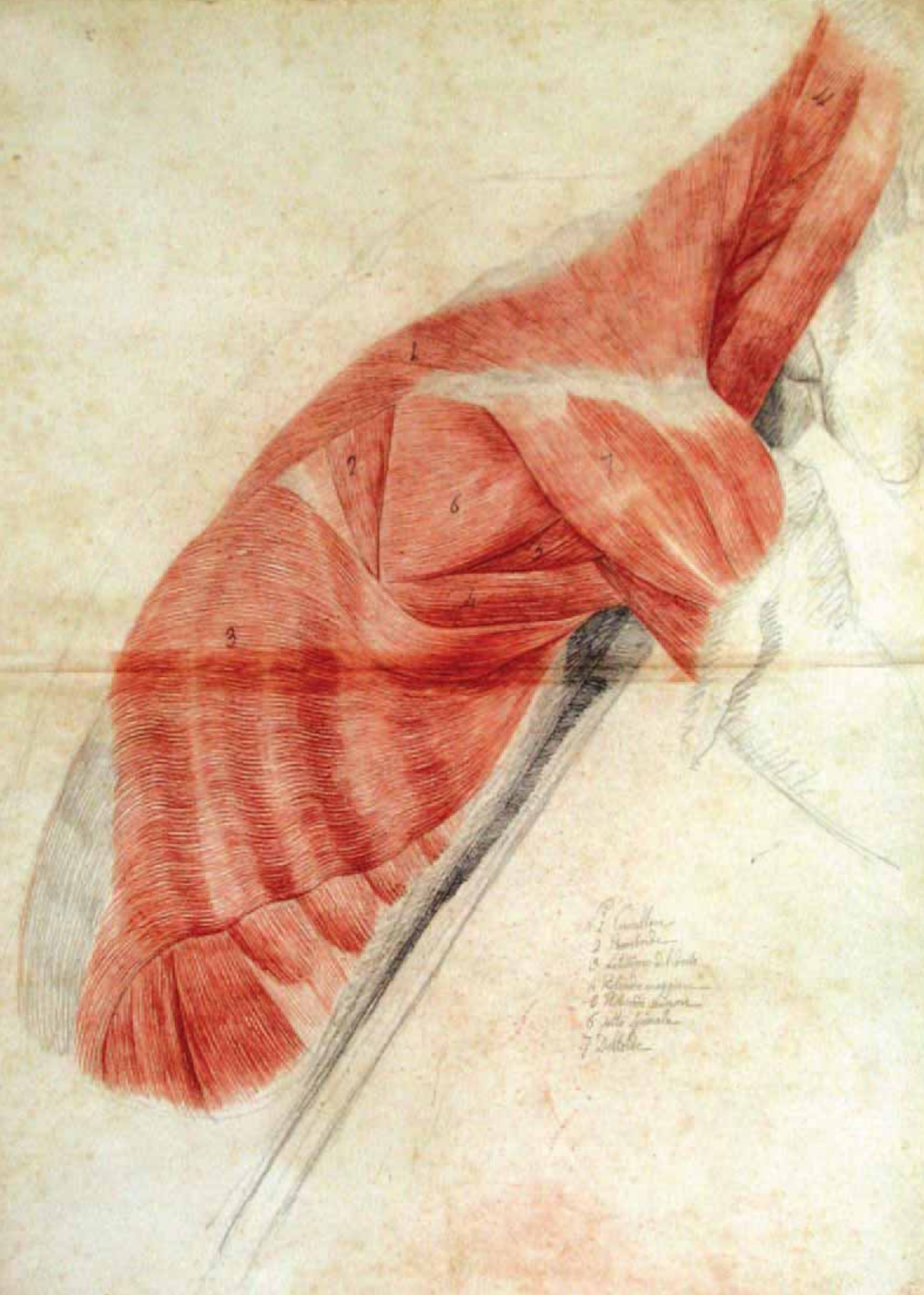

1
2
3
4
5
6
7

Plate III - Muscles of the thorax and abdomen

Muscles of the thorax and abdomen, upper layers, seen from the left side.
The arm is completely abducted.
In this prodigious plate in which the artist depicts the thoracic muscles, some muscles of the upper limb and the anterior abdominal muscles, there is no trace of a caption.
Illustrated are:
the pectoralis (*M. pectoralis major*), with its wide tendon of insertion on the humerus;
the *M. serratus lateralis*;
the *M. obliquus abdominis externus*;
the *M. rectus abdominis*;
the *M. obliquus abdominis internus* is roughly indicated.
In the armpit can be seen the *M. subscapularis*, the *M. latissimus* with its tendon flattened, the *M. teres, major*, the *M. biceps brachii*, the *M. coracobrachialis*, the *M. triceps brachii* (*caput longum*).

Plate IV - Muscles of the back

Illustrated are the muscles of the back, upper layer, with some adjoining muscles of the head, the neck, and the abdomen seen from the side.
This drawing would appear to be a first attempt at that in Plate II, in part from the expression of the figure, in part from the representation of the muscles.
For the nomenclature, reference should be made to that drawing.

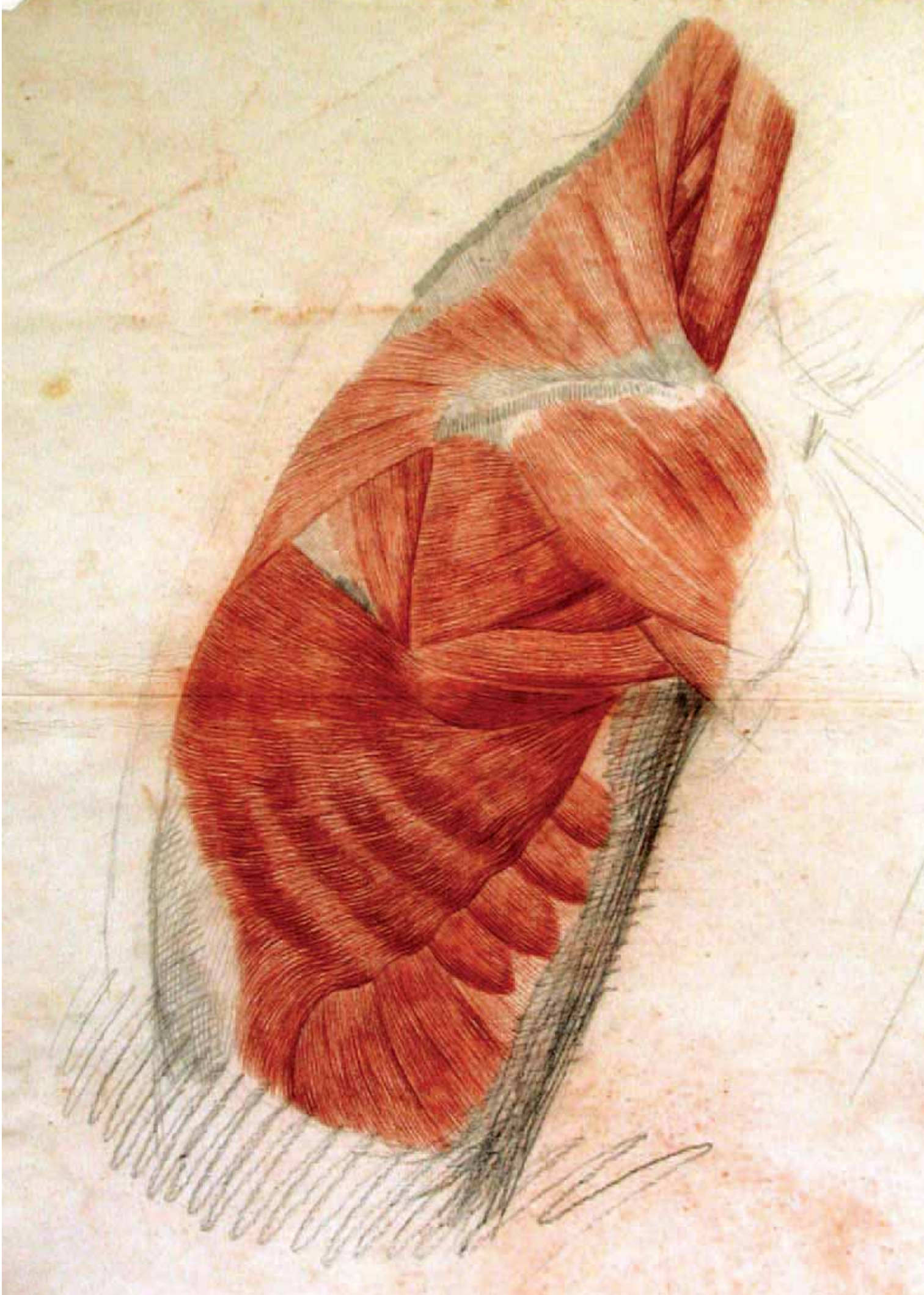


Plate V - Muscles of the left lower extremity

Muscles of the anterior and medial surface of the thigh.
Limb semi-flexed in which can be seen:
the *M. rectus femoris*;
the *M. vastus medialis*;
the *M. sartorius*;
the *M. adductor longus*;
the *M. gracilis*;
a part of the semimembranosus and a part of the adductor magnus;
a tract of the semi tendinoso with its long tendon of insertion at the tibia
and the *M. gastrocnemius*.

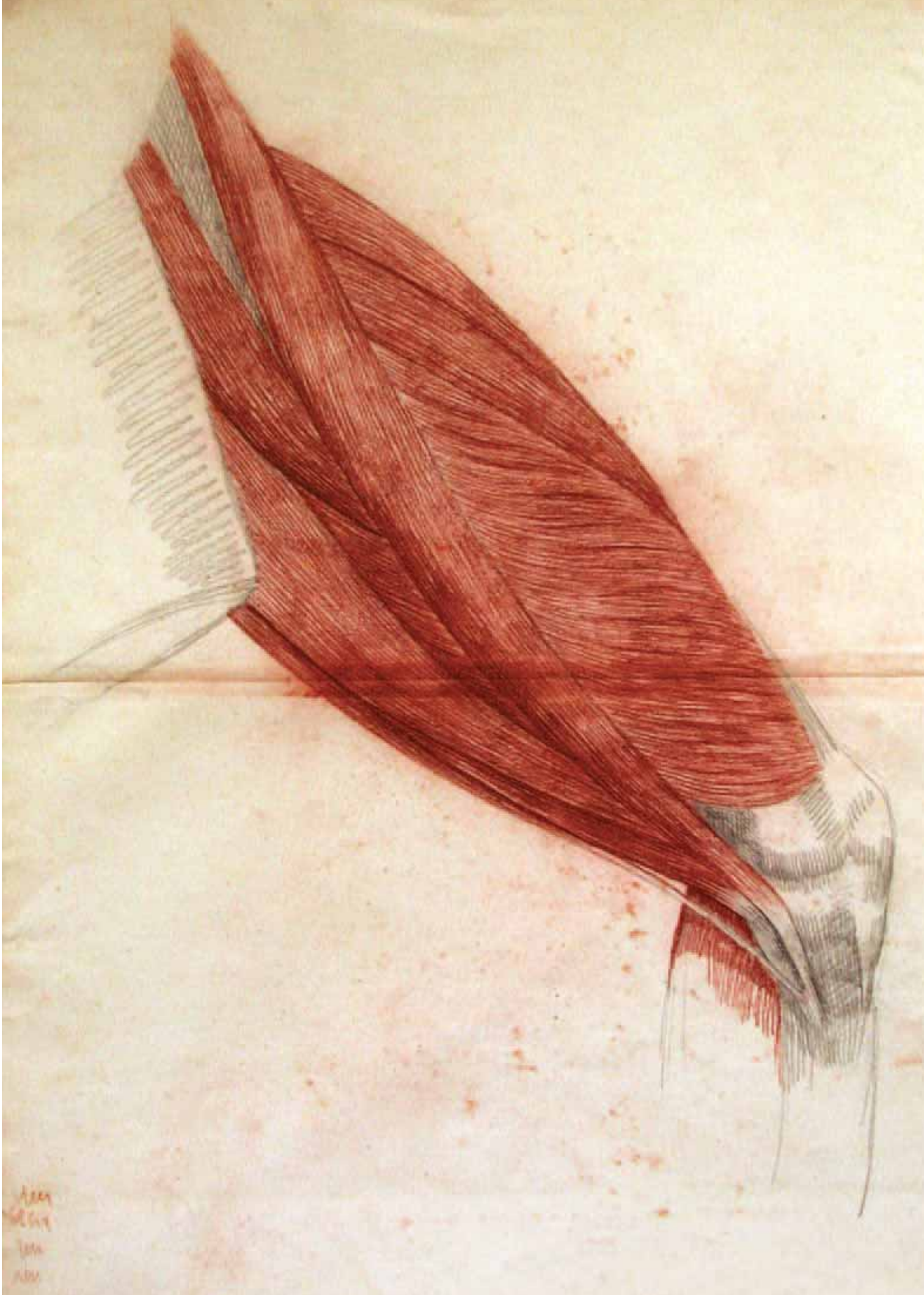


Plate VI - Muscles of the anterior surface of the left thigh seen from the front

The limb is in the extended anatomical position.
The artist shows:
the *M. sartorius*;
the *M. tensor fasciae latae*;
the *M. rectus femoris*;
the *M. vastus lateralis*;
the *M. vastus medialis*;
the *M. adductor longus*;
the *M. adductor magnus*;
the *M. gracilis* is not depicted;
the *M. ilopsoas* and the *M. pectineus* are outlined in black.

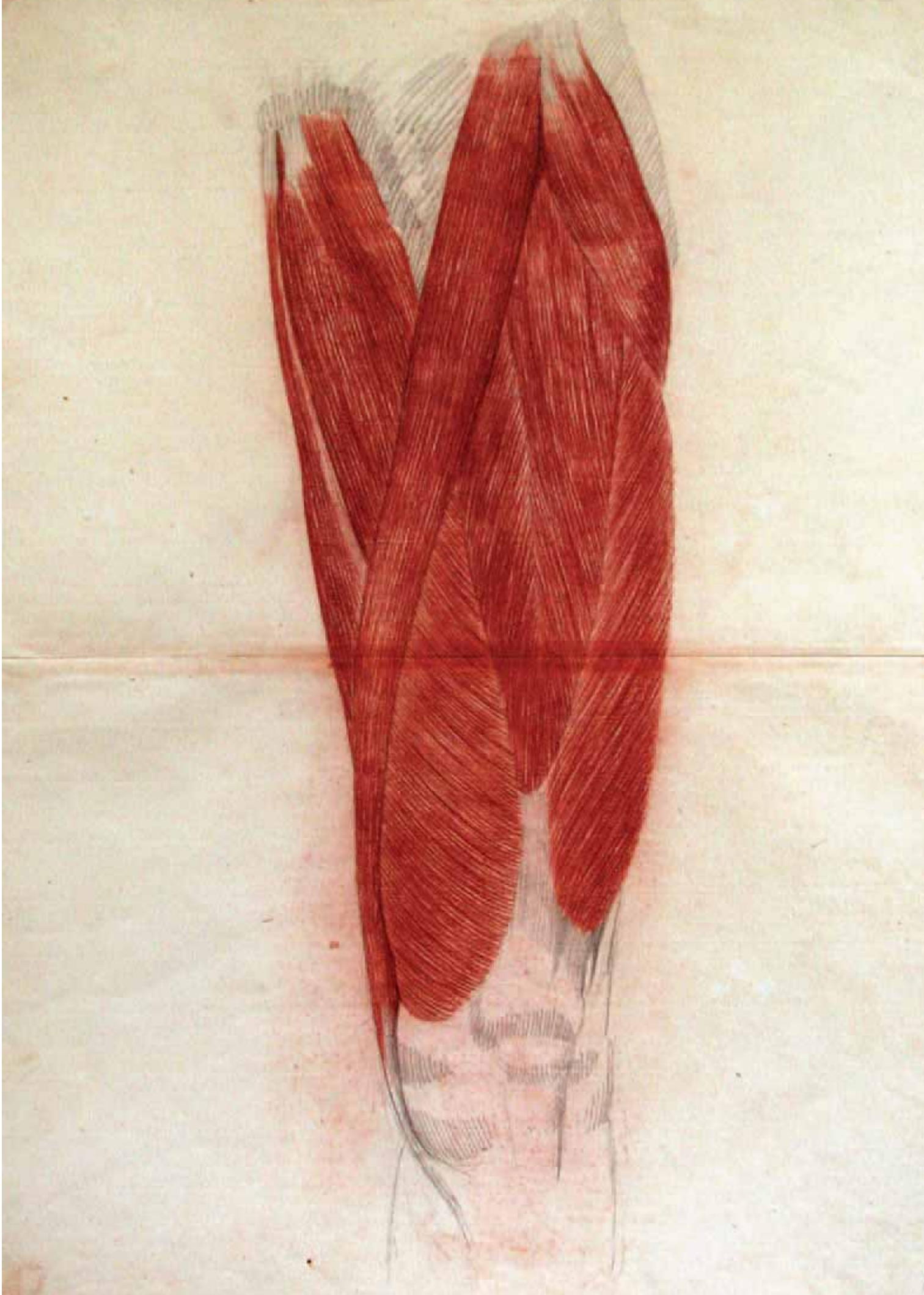


Plate VII - Posterior surface muscles of the left hip and thigh

Limb with the leg slightly flexed.
The artist illustrates, in the hip:
the *M. glutaeus medius*;
the *M. glutaeus maximus*;

in the thigh:
the *M. tensor fasciae latae* without the fascia upon which it is inserted;
the *M. vastus lateralis*;
the *M. biceps femoris* with its two fixtures, *caput longum et breve*;
the semimembranosus and an indication of *M. gastrocnemius*;
the *M. semitendinosus*.

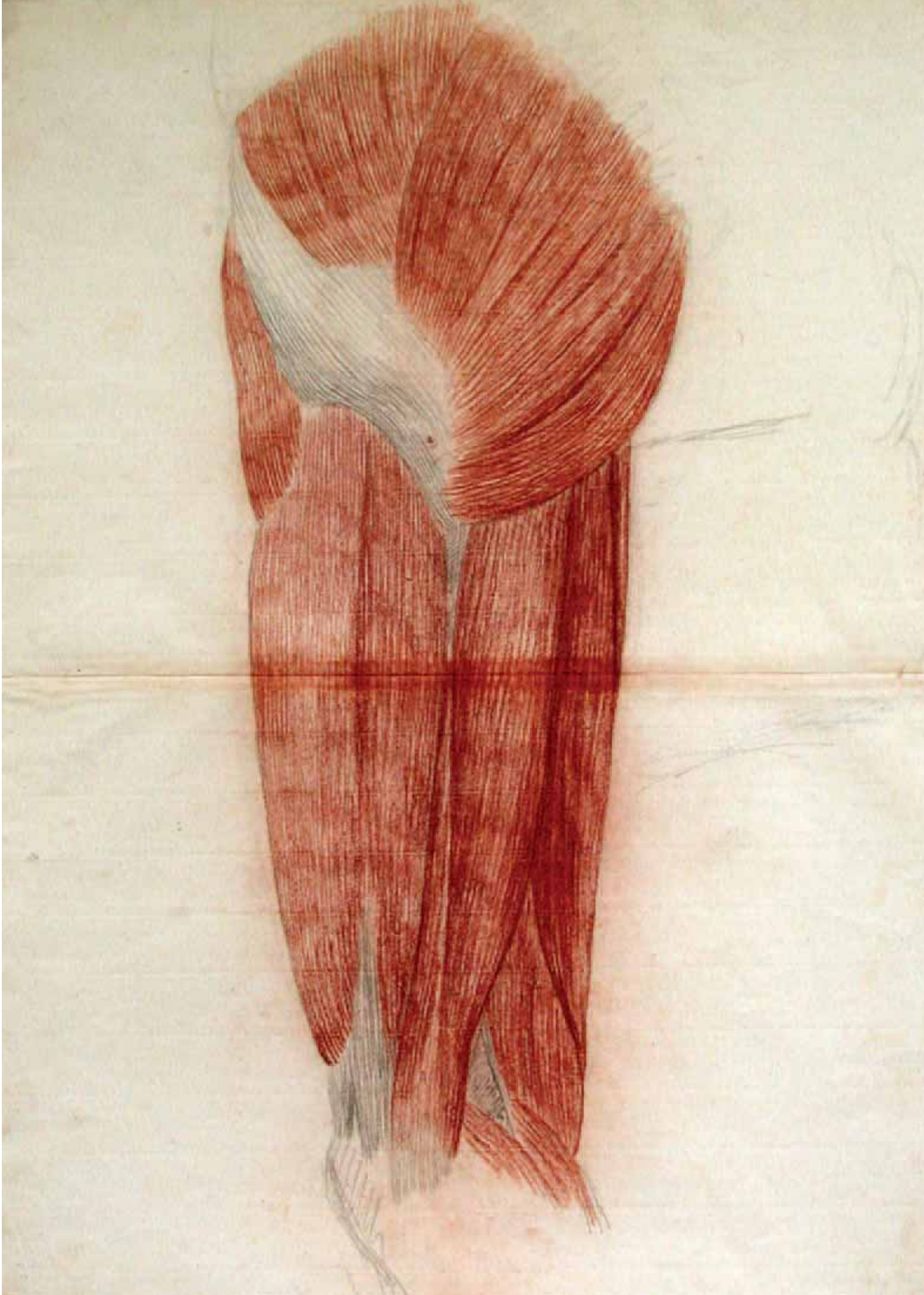


Plate VIII - Muscles of the leg and of the dorsal right foot seen from the side

In this beautiful Plate the Artist shows the extensor muscle group and that of the lateral muscles.

There are:
the *M. gastrocnemius*;
the *M. soleus*;
the *M. peronaeus longus*;
the *M. peronaeus brevis* in the side back;
the *M. tibialis anterior*;
the *M. extensor digitorum longus*.
In the foot at the articulation there are the *lingamentum cruciatum*,
the *M. extensor digitorum brevis*, the tendons of the extensor *digitorum longus*,
the tendons of the *peroneus longus* and the *peroneus brevis*;
lastly the *M. abductor digiti V*, the dorsal interossei vaguely drawn.

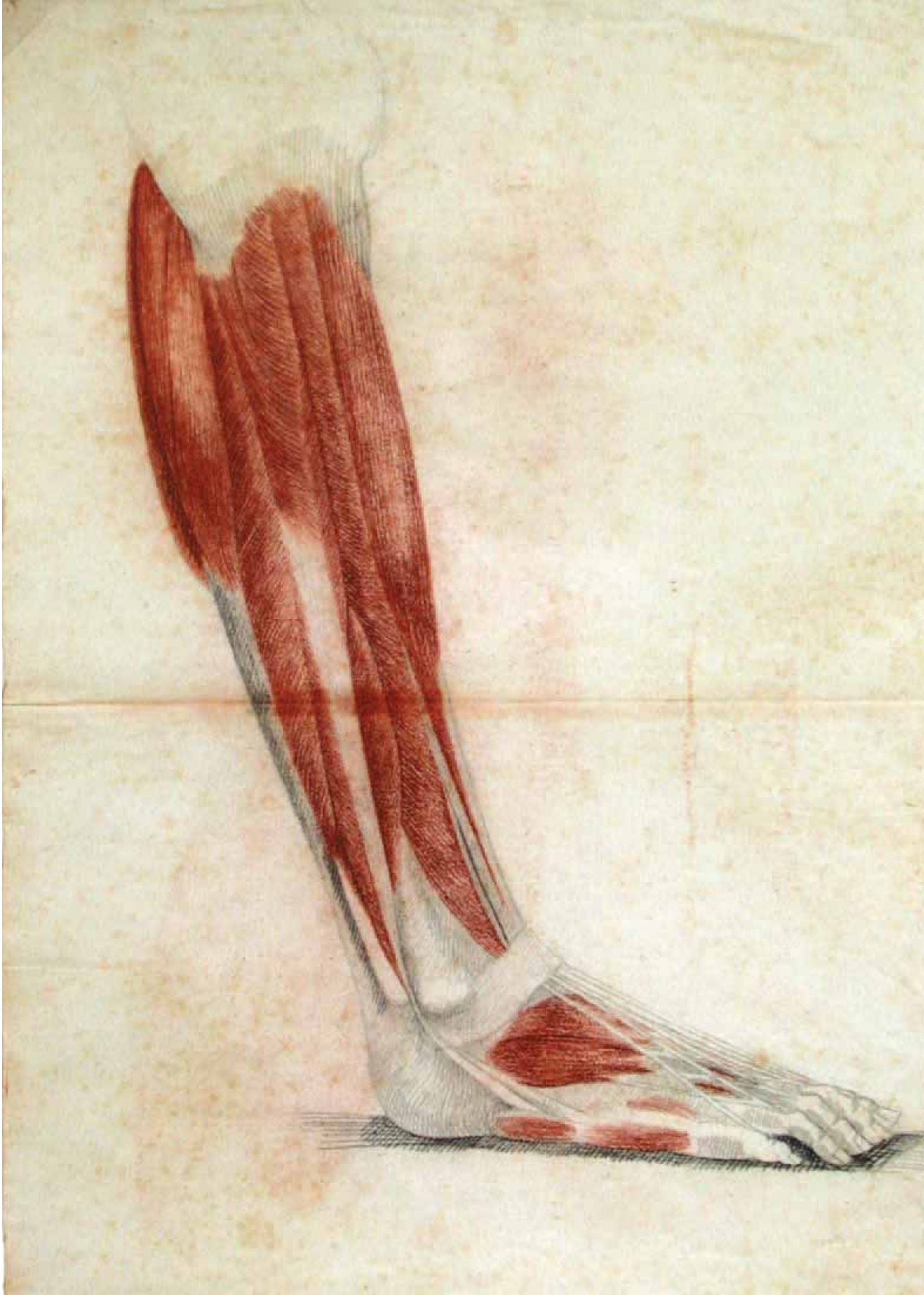


Plate IX - Muscles of the anterior upper layers of the leg and the back of the foot

The Artist shows:
the peroneus longus (*M. peronaeus longus*) 5;
the peroneus anteriore, named thus in error (*M. peronaeus brevis*) 6;
the extensor digitorum longus (*M. extensor digitorum longus*) 7;
the extensor hallucis longus (*M. extensor hallucis longus*) 8;
the tibialis anterior (*M. tibialis anterior*) 12.
Behind the tibia is an indication of the *M. gastrocnemius* and behind the *M. peronaeus* an indication of the *M. soleus*, which normally does not appear.
In the foot are shown the *M. extensor digitorum brevis*, the dorsal interossei muscles and the *M. abductor digiti V.*

5 Gran Peronea
6 Peronea Anteriore
7 Lungo Estensore della Dita
8 Lungo Estensore del Pollice
12 Tibiale anteriore
13

Plate X - Muscles of the upper layer of the posterior of the right leg

In this anatomically imprecise Plate the Artist shows:
the gastrocnemius (*M. gastrocnemius*) 1;
the soleus (*M. soleus*) 2, whose portions and anatomical relationships are not respected;
the *tendo calcaneus*;
the *flexor longus* of the toes 3, which in reality is the *M. flexor hallucis longus,*
and what appears under the number 4 is the *flexor longus* of the toes (*M. flexor digitorum longus*).
The *M. paeroneus brevis* and the *M. abductor hallucis* can also be seen.

1 Gastrocnemio
2 Solare
3 Flessore lungo delle Dita

Plate XI - Muscles of the sole of the foot

In this Plate the foot is represented with the tips of the toes towards the ground,
the *tuberis calcanei* at the top;
the Artist wishes to highlight:
the abductor hallucis (*M. abductor hallucis*) 1;
the flexor hallucis brevis of the toes, 2, unclear as to whether it was wanted covered
by the aponeurosis which therefore completely covers the flexor hallucis brevis
and cannot be mistaken for the muscle;
the flexor digitorum longus (*M. flexor digitorum longus*) 3,
which passes through the the *liciniatum* ligament;
the abductor digiti minimi (*M. abductor digiti V*) 4,
and above can be seen the flexion of the V toe;
the peroneus brevis (*M. peronaeus brevis*) 13, whose numeration should have been
to the side with the Achilles tendon and not next to the flexor digitorum longus
which is, rather, the tibialis posterior;
on the other side there is the peroneus brevis; there is a glimpse of the flexor hallucis brevis.

1 Tenore
2 Corto flessore delle dita
3 Lungo flessore delle dita
4 Flessore del minimo
13 Sovrano Posteriore

Plate XII - Muscles of the upper layer of the foot seen from the side back

Shown are:
the extensor *hallucis brevis* (*M. extensor hallucis brevis*) 9;
the extensor *digitorum brevis* (*M. extensor digitorum brevis*) 10;
the dorsal interossei (*M. interossei dorsales*) 11;
there are also the abductor of the V finger, the common extensor of the fingers;
the extensor hallucis longus; the tibialis anterior; the peroneus brevis
and the tendons of the peroneus longus.

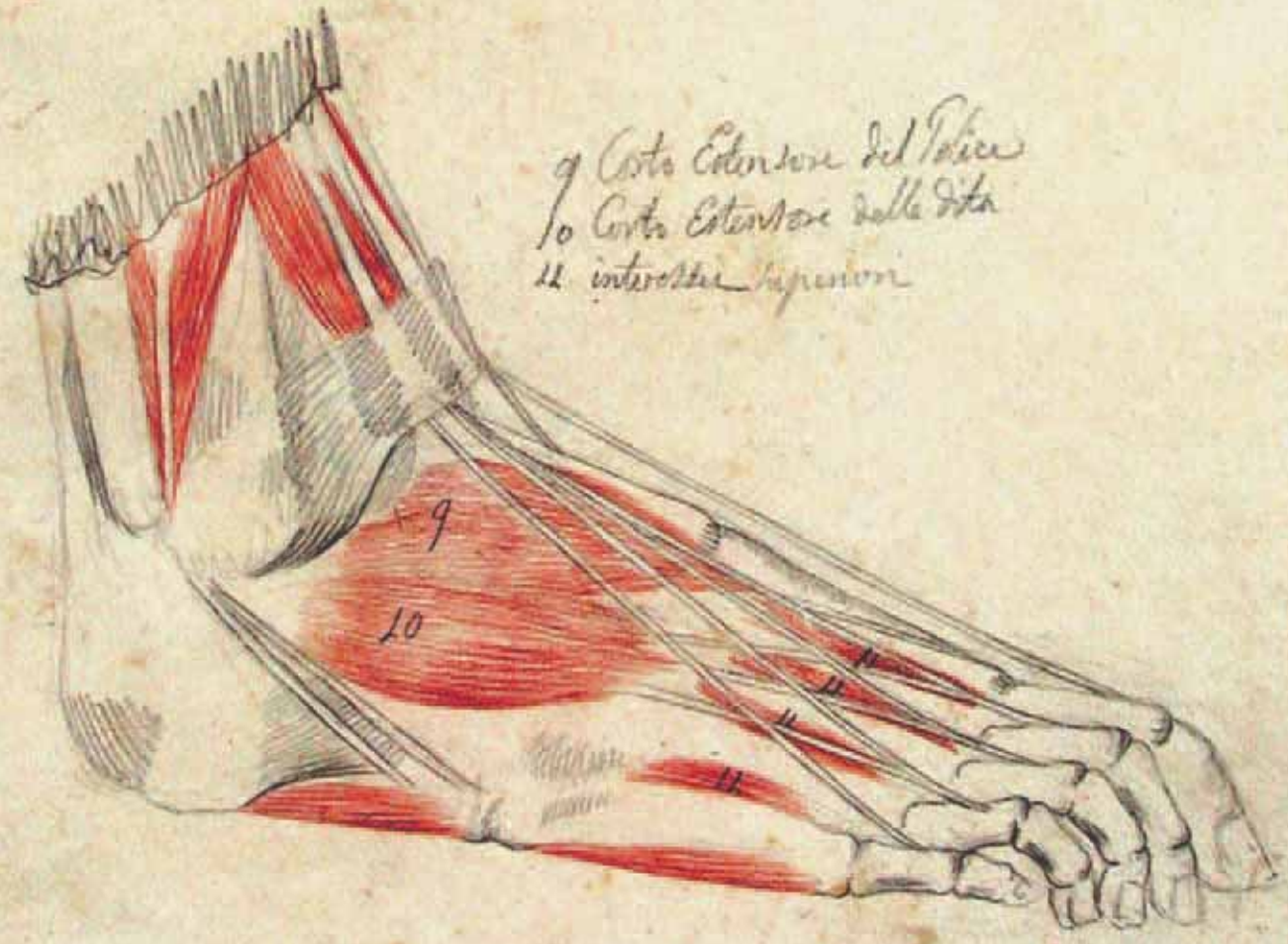

9 Corto Estensore del Pollice
10 Corto Estensore delle Dita
11 interossei superiori
9
10
11
11
11

Plate XIII - Muscles of the left superior extremity shoulder and arm

The Artist shows the limb semi-flexed with:
the deltoid (*M. deltoideus*);
in the posterior part, the triceps (*M. triceps brachii*) with its *caput laterale*
and *caput longum*; laterally the *M. brachialis* and the *M. brachio radialis* predominate;
underneath are the *M. extensor carpi radialis longus*; in front the *M. biceps*.

Plate XIV - Muscles of the left superior extremity
seen from the side

Anatomists divide the muscles of the upper extremities into four groups.
The first of these includes the muscles of the shoulder, the second those of the arm,
the third those of the forearm, the fourth the muscles of the hand.
In this Plate, which is one of the most elaborate by the Artist, are drawn only the deltoids
of the muscles that originate from the scapular girdle. Further,
the pectoralis maior is vaguely indicated.
The *Acromion* and the clavicle are evident.
The Artist has indicated on this Plate a list of 26 names
of muscles without paying attention to their anatomical position.
He only respected the three great divisions of the limb: arm, forearm and hand.
The list also includes the muscles illustrated in Plate XVI.
The number shown on the muscles in that Plate can be identified
in the caption for this drawing.
Perfectly drawn for the shoulder are the shoulder and the deltoid,
for the arm, in the front are the biceps and the brachial
even if the Artist does not list this muscle;
behind are the triceps with its insertion with tendons in common with the posterior surface
of the olecran which is evident as is the lateral epicondyle of the humerus.
In the forearm are illustrated the surface and extensor muscles:
the long supinator (*M. braccio radialis*) 6;
the *extensor carpi radialis longus* (*M. extensor carpi radialis longus*) 18;
the *extensor carpi radialis brevis* (*M. extensor carpi radialis brevis*) 19;
the extensor digitorum 17 which according to the artist should have included
the *M. extensor pollicis brevis* and the *M. abductor pollicis longus*;
the *extensor digitorum* (*M. extensor digitorum communis*) 20;
the *extensor digiti minimi* (*M. extensor digiti V proprius*) 21;
the *extensor carpi ulnaris* (*M. extensor carpi ulnaris*) 22;
the *flexor carpi ulnaris* (*M. flexor carpi ulnaris*) 23;
the *dorsal interossei* (*M. interossei dorsales manus*) 24;
the thenar 25, which is rather the interosseo of the I space.
Above are the abductor *pollicis brevis*; from the side opposite the thumb;
abductor *digiti minimi* (*M. abductor digitis V*) 26.

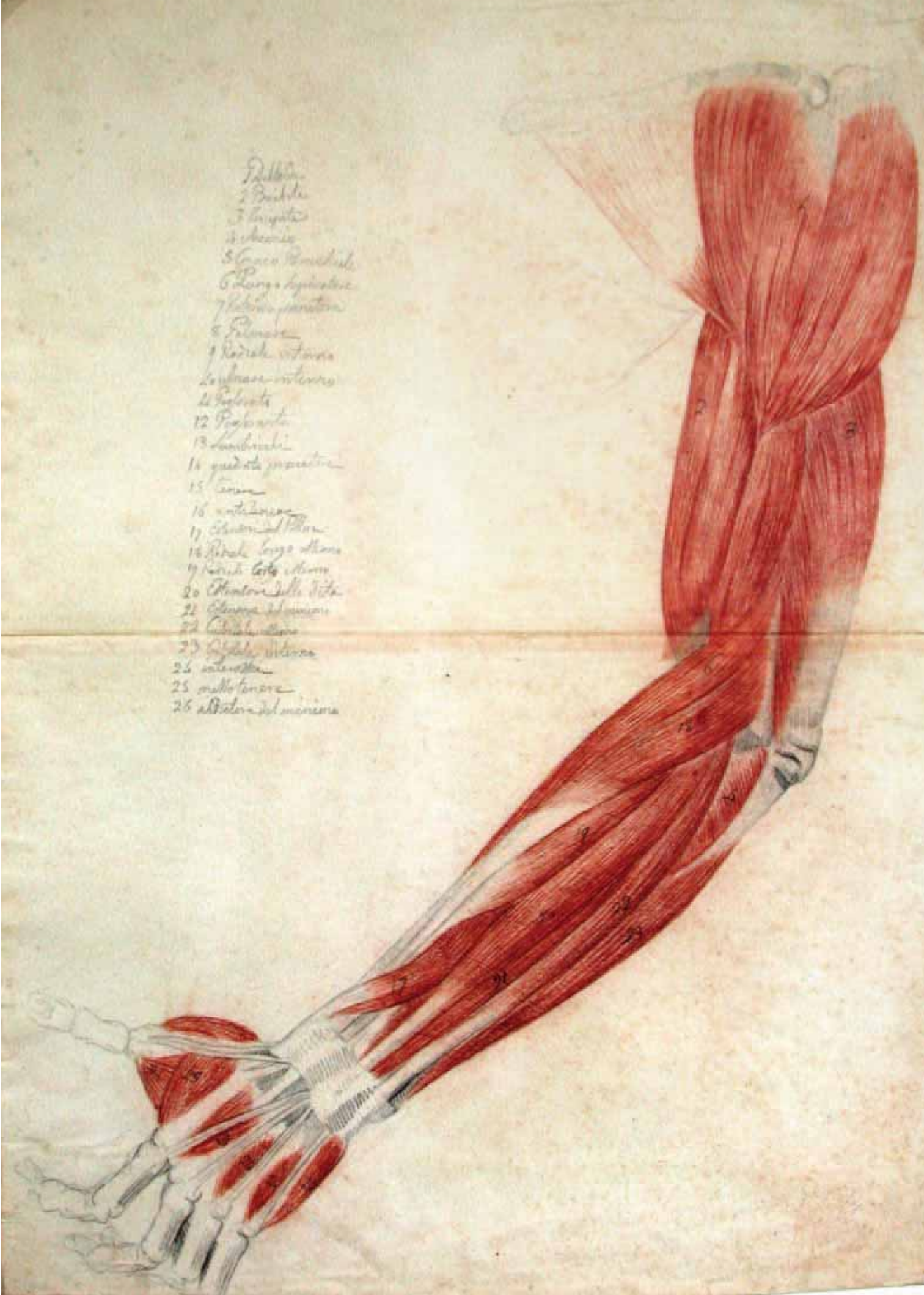

1 Deltoide
2 Bicipite
3 Brachiale
4 Anconeo
5 Grande Pettorale
6 Lungo Supinatore
7 Radiale anteriore
8 Palmare
9 Radiale esterno
10 Cubitale interno
11 Cubitale
12 Pronatore
13 Lombricali
14 quadrato pronatore
15 Tenore
16 estensore
17 estensore del Pollice
18 Radiale lungo esterno
19 Radiale Corto esterno
20 Estensore delle Dita
21 Estensore del mignolo
22 Cubitale esterno
23 Radiale esterno
24 estensore
25 molto tenore
26 abduttore del mignolo

Plate XV - Muscles of the left upper extremity seen from the front

A beautiful Plate from both the anatomical and drawing point of view.
Even if the caption is missing, the Artist has emphasized the following muscles:
M. deltoideus;
M. brachialis;
M. triceps brachii;
M. biceps;
M. brachio radialis;
M. extensor carpi radialis longus;
M. extensor carpi radialis brevis;
M. flexor carpi radialis;
M. pronator teres;
M. palmaris longus;
M. flexor carpi ulnaris;
M. flexor digitorum superficialis;
M. pronator quadratus.

In the hand are seen:
the *M. abductor pollicis brevis*;
the *M. flexor pollicis brevis*;
the *M. abductor pollicis*;
the *M. abductor digitis V*;
the *M. lumbricales*.
The carpal transverse ligament also shows up well.

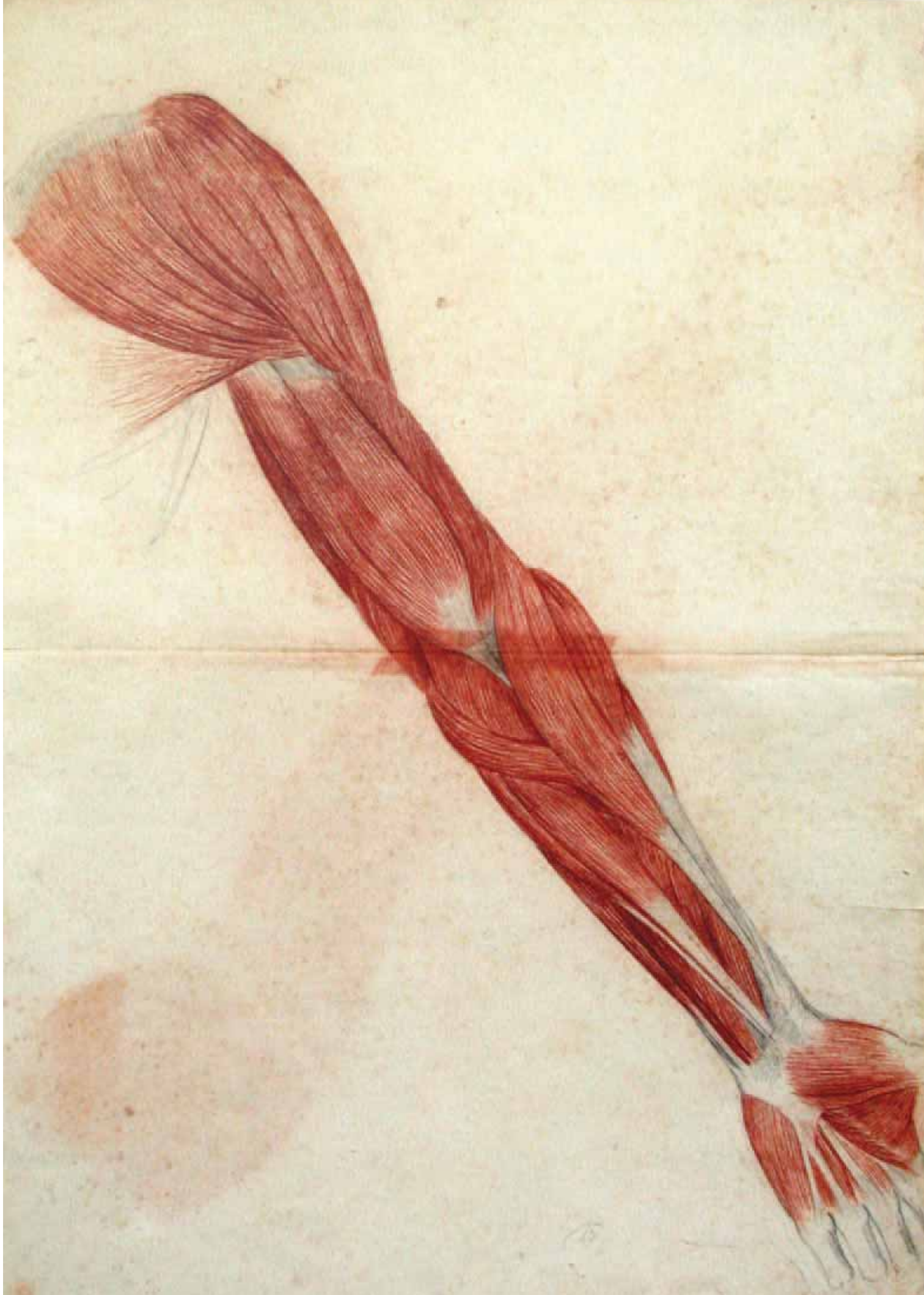


Plate XVI - Muscles of the left upper extremity seen from the medial side

Limb semi-flexed in which the numbers marked by the Artist in the various muscles make reference to the caption of Plate XIV.
Seen are the muscles:
M. triceps branchii 3;
M. coraco brachialis 5;
M. brachialis (without number in both plates);
the *brachioradialis* (*M. brachio radialis*) 6;
the *pronator teres* (*M. pronator teres*) 7;
the *palmaris longus* (*M. palmaris longus*) 8;
the *flexor carpi radialis* (*M. flexor carpi radialis*) 9;
the 10 which is, rather, the *M. flexor digitorum superficialis*
because that which the artist labels internal ulnar is the *M. flexor carpi ulnaris*
which is un-numbered;
the tendons of the perforate 11;
the perforator (*M. flexor digitorum profundus*) 12, which is normally not seen;
the lumbricals (*faccia palmare*) 13;
the *pronator quadratus* 14 (which cannot be seen);
the thenar (*abductor pollicis brevis*) 15;
the anti thenar 16, formed from the flexor pollicis brevis and the adductor pollicis.
Without distinction are shown the muscles of the hypothenar region.

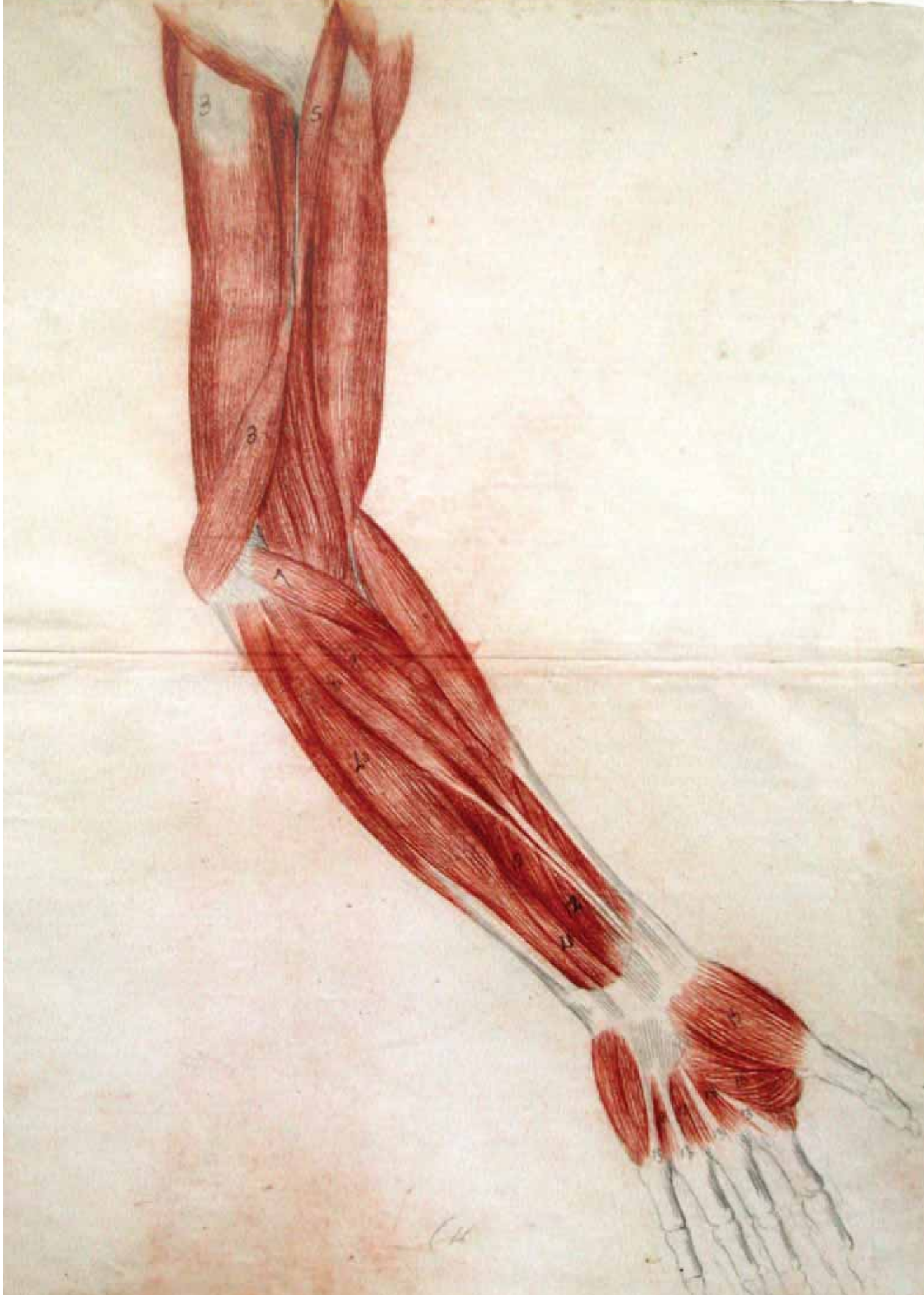
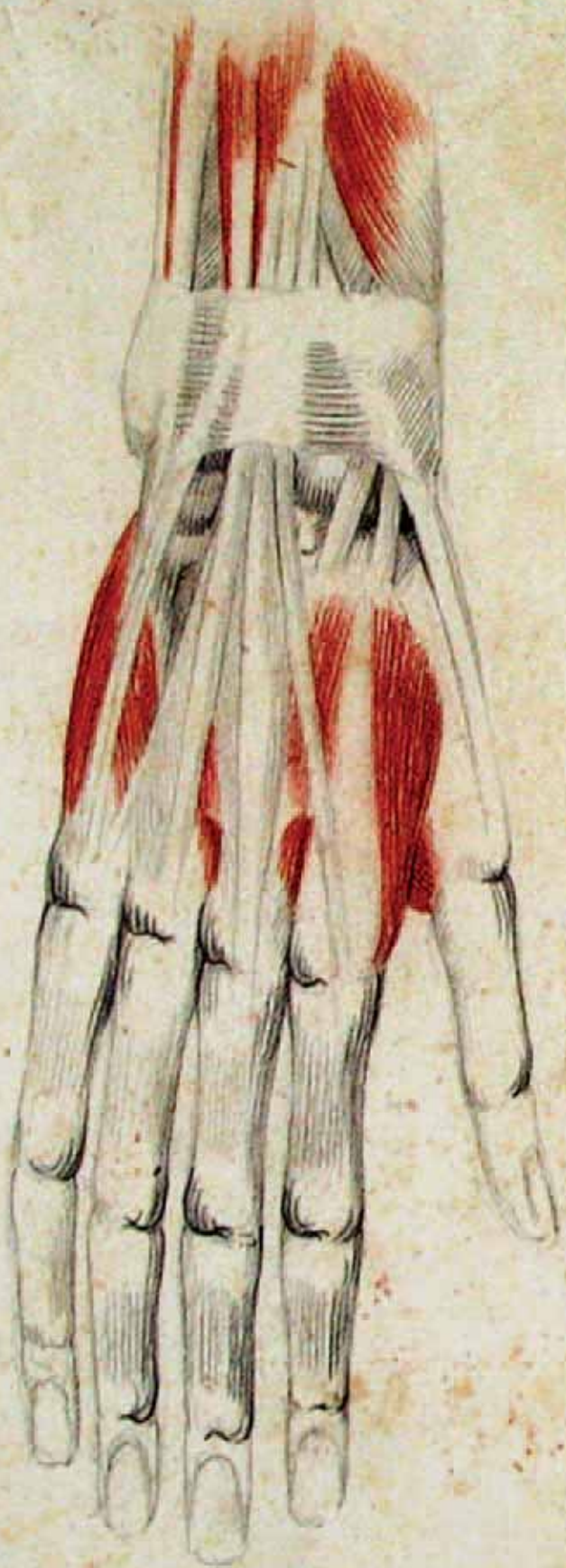

B
S
B
A

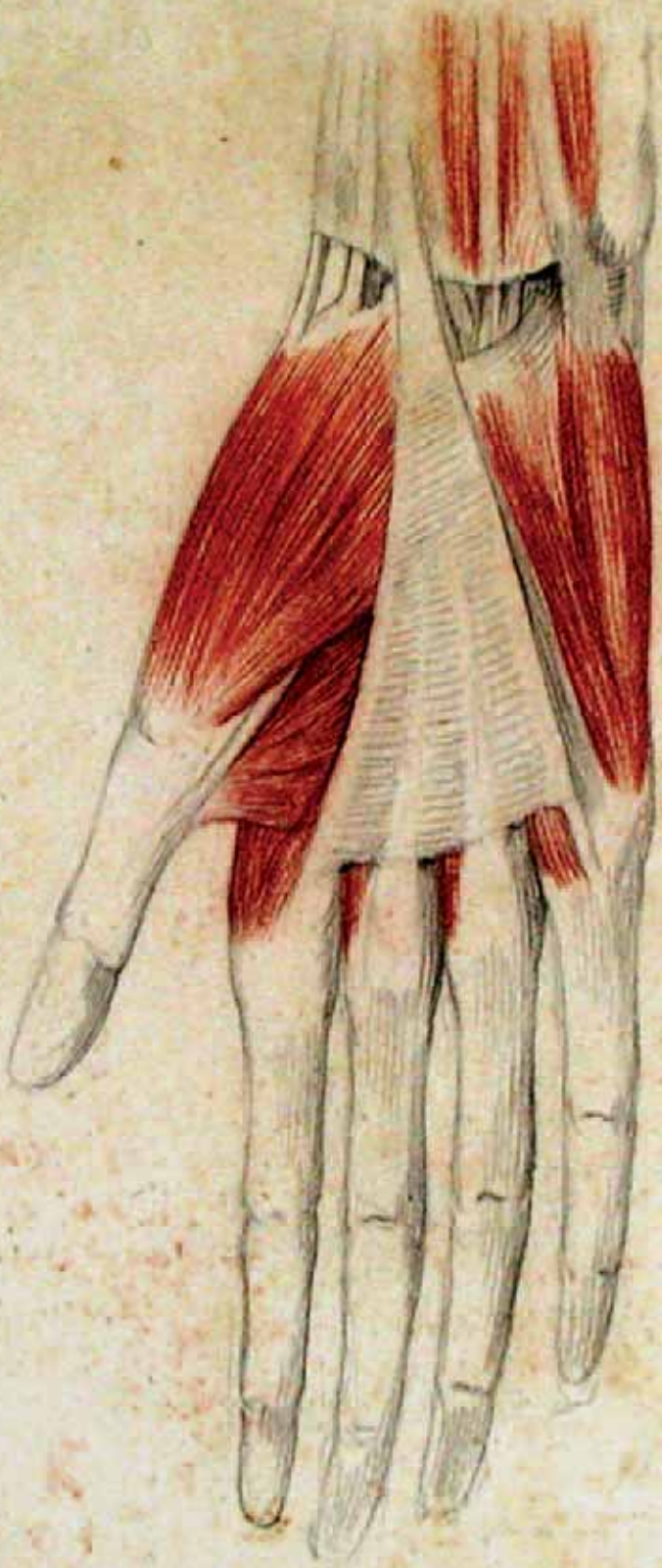
Plate XVII - Muscles of the right hand seen from the dorsal (left) and palmar (right) views

Extremely delicate work of drawing and anatomy.

From the dorsal side can be seen:
the *ligamentum carpi dorsale*;
the *tendo m. extensoris carpi radialis brevis*;
the *tendo m. extensoris pollicis longi*;
the *tendo m. extensoris carpi radialis longi*;
the *tendo m. extensoris digitorum communis*;
the *M. interosseus dorsalis primus*;
the *dorsal interossei* II, IV;
the *tensor M. extensoris digiti V proprii*.

From the palmar side:
the *aponeurosis palmaris*;
the *M. abductor pollicis brevis*;
the *M. adductor pollicis*;
the *M. abductor digitis V*;
the *M. flexor digitis V brevis*;
the *M. lumbricales*;
Without distinction the *M. flexor pollicis brevis*.





Chronology

1931 **Rome, July 6.** The first stone of the Public Health Institute is laid close to the Cemetery of Rome, the "Policlinico Umberto I" and the Cancer Research Institute "Regina Elena". The **Rockefeller Foundation** provides funding up to one million dollars for the construction of the building.

1934 The **law of January 11, 1934** defines the *status* and the functions of new Institute: "The Institute of Public Health is established in Rome, in the service of Home Affairs, as a center for investigations, researches and verifications, pertaining to public health services and for the specialization of the personnel of the said services in the kingdom". The first directors are **Gaetano Basile** (1934-1935) and, for four months, **Dante De Blasi**.

April 21. Official inauguration of the Public Health Institute.

1935 **July 25. Domenico Marotta** is appointed Director of the Public Health Institute.
The **Radium Office** moves from via Panisperna, in Rome, to the Public Health Institute. Established in 1923, the Radium Office was directed by **Giulio Cesare Trabacchi**. In 1925, it was re-named "Physics Laboratory of Public Health" and was housed by the Royal University Physics Institute in Rome. Most celebrated physicists, such as Enrico Fermi, Franco Rasetti, Emilio Segrè, Edoardo Amaldi and Bruno Pontecorvo work in the Physics Laboratory.

The Public Health Institute resumes some of the **Rockefeller Foundation** activities. In the 1920s and 1930s, the Rockefeller Foundation had been instrumental in creating the Experimental Station for the Fight against Malaria. An American scientist, **Lewis W. Hackett**, collaborates with **Alberto Missiroli**, one of the most important malariologists in Italy.

1938 **Enrico Fermi** moves to the United States. In the same year, he receives the Nobel Prize for Physics.

1941 The Institute takes today's denomination: **Istituto Superiore di Sanità** (National Institute of Health).

1945 The Institute comes through undamaged during the Second World War. The number of activities in the biology and microbiology laboratories increase. The Institute is fully operational in the fight against malaria. In order to eliminate the vectors of malaria, a new compound is employed for the first time in Italy: DDT.

Ernst Boris Chain, who will be heading a Center within the Institute in later years, is awarded the Nobel Prize for Physiology or Medicine together with Alexander Fleming and Howard Florey.

1946 **Missiroli** presents a plan to defeat malaria. The plan is approved by the High Commissariat for Hygiene and Public Health.

1947 Marotta invites **Daniel Bovet** to join the Institute and to direct the Laboratory of Therapeutic Chemistry. Bovet enters upon office in 1948.

1948 Marotta invites **Ernst Boris Chain** to set up the International Center for Microbiological Chemistry. A strong impulse to the development of the bio-technological research is provided.

1957 **Daniel Bovet** is awarded the Nobel Prize for Physiology or Medicine for his discovery of synthetic compounds for the blocking of the effects of certain substances occurring in the body, especially in blood vessels and skeletal muscles.

1958 The Institute falls within the remit of the newly established Ministry of Health.

1961 After 26 years, Marotta leaves the Institute.

1964 Daniel Bovet leaves the Institute. **Giordano Giacomello**, a chemist, is Marotta's successor. After three years, **G. Battista Marini Bettolo Marconi** is appointed Acting Director. His designation will be confirmed only in **1968**.

1969 A legislative bill on the reform of the Institute is withdrawn. In an atmosphere of general upsetting, the Institute staff sit in a permanent assembly. The Italian police clear the ground and arrest demonstrators.

1972 **Francesco Pocchiari** is the new Director of the Institute.

1973 The **law of August 7, 1973, n. 519** modifies the tasks, regulations and structure of the Institute, that gets more funds for the biomedical and health research and carries out control activities.
The Institute is present in different health emergencies in Italy such as:
- *the epidemic cholera in Naples and in other places in Southern Italy* (1973). The Institute coordinates the epidemiological observatories for the infectious diseases;
- *dioxin-leak at the ICMESA plant in Seveso* (1976). The Institute plays an important role in locating and isolating the polluted area and in reckoning the risk for the population;
- *earthquake in Irpinia* (1981). The ISS overtakes the emergency by preparing landing hospitals, either civil or military, vaccinating the local population and re-establishing waterworks;
- *Chernobyl nuclear accident* (1986). The Institute evaluates information about pollution, collected from different parts of the Italian territories.

1989 **Francesco Pocchiari** dies. **Vincenzo Longo** is *ad interim* Director for a short while, before **Francesco Antonio Manzoli** is appointed.

1993 **Giuseppe Vicari**, Head of the Immunology Laboratory, leads the Institute; only in 1995, however, his appointment is validated.

1996 **Aurelia Sargentini** acts as the Director of the Institute from 1995 to 1996; **Giuseppe Benagiano**, Professor of obstetrics and gynecology and responsible for many World Health Organization programmes, is the new Director of the Institute.

2001 With a Presidential decree (70/2001) a **new Regulation** is issued. The legal *status* of the Institute is modified. As public corporation and technical and scientific body of the Servizio Sanitario Nazionale (National Health Service) the Institute carries out activities of research, clinical trials, control, consultation, documentation and training in public health. **Enrico Garaci** is the first President of the new Institute and **Romano Rosario Di Giacomo** is the Director General.

2002 **Sergio Licheri** is the new Director General.

2003 The new organizational chart is structured into **seven Departments** - Environment and Primary Prevention; Cell Biology and Neurosciences; Haematology, Oncology and Molecular Medicine; Drug Research and Evaluation; Infectious, Parasitic and Immune-Mediated Diseases; Food Safety and Veterinary Public Health; Technology and Health - and into **2 National Centers** - National Center for Epidemiology, Surveillance and Health Promotion and National Center for Food Quality and Risk Assessment.

2004 The ISS celebrates its **70th birthday**.

Information for this *Chronology* is from:

Bignami G. Origins and subsequent development of the Istituto Superiore di Sanità in Rome (Italy). *Annali d'Igiene* 2002;14(Suppl. 1):67-95.

Donelli G, Serinaldi E. *Dalla lotta alla malaria alla nascita dell'Istituto di Sanità Pubblica. Il ruolo della Rockefeller Foundation in Italia: 1922-1934.* Roma-Bari: Editori Laterza; 2003.

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