

# THE EARLY YEARS OF HEMATOLOGY: GABRIEL ANDRAL AND GIULIO BIZZAZERO'S SOLUTIONS TO THE BLOOD ENIGMA

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## Introduction

"...the field of hematology, under the guide of Andral, assumed a new fundamental role in the branch of pathology."

Gabriel Andral (1797-1876) is the undisputed father of modern hematology, a position already acknowledged by his contemporaries. Since his early studies in physiopathology, Andral showed his interest for this field and between 1840 and 1842, he started to center his research on the composition of blood. In this manner the field of hematology, under the guide of Andral, assumed a new fundamental role in the branch of pathology. His findings laid the foundation stone for the next generations of doctors. Following in Andral's footsteps, Italian Giulio Bizzozero (1846-1901) conducted important studies on the hematopoietic function of the bone marrow and on the platelets.

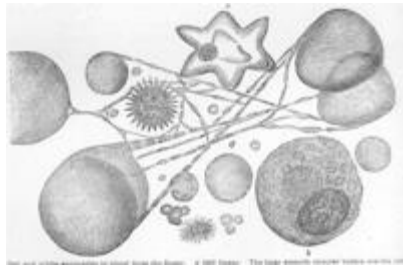


## Aim of the project

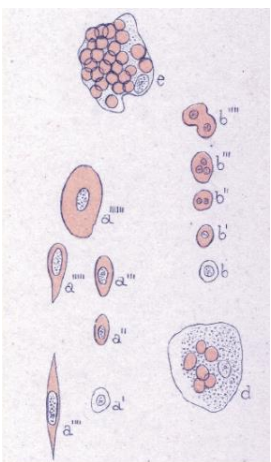
The aim of this project is to describe the ideal thread that connects those two great scientists.

## Haematologic discoveries

Gabriel Andral, with his most important work, *Essai d'Étiologie Pathologique* (1843), displayed all his discoveries in the field of haematology. Starting from his first studies, he marked a turning point in this field by considering the study of



the blood as a clinical branch of knowledge. Andral is the first one to understand the necessity to define standard measures of the blood components and thanks to the chemical and microscopic analyses, he described the physiological composition of the human blood. He was also able to classify illnesses based on haematocrit alterations, thus he listed three types of alteration. In the last part of his work he characterized the blood composition in case of fever and inflammation, and he introduced for the first time the terms "sideremia" (low iron blood level) and "anaemia" (low haemoglobin level). He also examined free radicals, fibrin and albumin and described various blood alterations, such as sepsis, polycythaemia, and lead poisoning.



Giulio Bizzozero is overall known for his important studies in the haematologic branch, his works on the formed elements of the blood and on the mechanism of clotting are of particular relevance. His working life was full of discoveries starting from the one of 1869, just three years after the degree, when he noted the value of blood transfusion in treating anemia. In 1881 he described platelets as a third element in blood and he also demonstrated their role in clotting through aggregation and clumping with the formation of thread-like structures now known as fibrin. Other significant work by Bizzozero

included research of haematopoiesis in the bone marrow. His observations on the bone marrow started before his degree, when he still was a student in the laboratory of Paolo Mantegazza. He was the first one to classify the bone marrow as "red, yellow and gelatinous" and he suggested its function in the production of white and red cells and in some cases in the degradation of red cells.

## Andral and Bizzozero's innovations



Both Andral and Bizzozero were two farsighted scientists.

Since the start of haematologic studies Andral developed more efficient methods for its work, introducing his innovative point of view on the use of the microscope. This instrument was not commonly used during this period, but Andral, understood the benefit of its practice, especially in the study of the blood. For that reason, the analysis of blood and its alteration were only run following a strict pattern of three phases: all of them needed the use of the microscope.

"As for Bizzozero, [...] he was considered as the most expert Italian doctor in the use of microscopic techniques."

As for Bizzozero, thanks to the published work between 1862 and 1868, he was considered as the most expert Italian doctor in the use of microscopic techniques. Above all, he invented a new instrument, the chromocytometer, which could dose the level of haemoglobin in the blood. It is still the most common used instrument for haematologic studies. He also wrote the *Manuale di microscopia* (1879), translated in French, English and Russian, which regard the use of the microscope and allowed every doctor to



learn the techniques and the observational methods that Bizzozero had applied to the microscopic studies. Bizzozero himself admitted that the aim of his work was to spread the use of the microscope as a diagnostic instrument between doctors.



Professor of General Pathology in Paris

Haematology: description of the blood composition

Other works: research on haemorrhages, tumours, inflammation

Supported the use of the microscope

Professor of General Pathology in Pavia

Haematology: description of many haematologic processes

Other works: research on inflammation, tuberculosis Helicobacter pylori

Spread the use of the microscope as a diagnostic tool.



## Conclusion

"...the mystery around the field of haematology was solved..."

All the Andral and Bizzozero's discoveries and the innovations allow us to define them as the fathers of haematology. We can say that the studies of Andral lead to the development of haematology, and they were then followed and improved by Bizzozero. Thanks to their contribute to the scientific world the mystery around the field of haematology was solved and it laid the foundations for the modern haematologic sciences.

We can suppose that it is not a case that both were passionate about haematology. Even if they probably never met each other, there are many aspects that associate these two scientists: being farsighted, being open-minded, and being able to go beyond the limit of their time. It is only thanks to these two great personalities, bonded by the interest in haematology, that we now can benefit from the haematologic sciences.