EDITORIAL

In the present issue, the reader will encounter a topic familiar on these pages since 2000, when the *Revue d'histoire des mathématiques* sounded a call for papers related to a theme we have subsequently termed the « *history of the mathematical culture of engineers* » . Here, Konstantinos Chatzis considers a field of applied geometry called graphic statics[2] and analyzes how this new field was received in France. Created by Carl Culmann (1866), graphic statics aims at representing graphically the relations between forces acting on constructions like bridges, railways, etc., and also at substituting graphical procedures for the long and somewhat complex analytical calculations. While these methods for solving the day-to-day problems of engineers were well received especially in German-speaking countries, they were only lately embraced in France. Chatzis emphasizes this paradoxical situation, highlighting the fact that the discipline failed to be born in France several times beginning in the 18th century. One of its fundamental concepts, the funicular polygon (cf. the appendix to Chatzis' paper), had already played an important role in the mechanics of Pierre Varignon (1725). Used by Charles Bossut and Charles-Etienne-Louis Camus, this concept was reinvented early in the 19th century by Jean-Victor Poncelet who developed graphical methods based on it in the context of his teaching. At the same time, Claude Navier at the Ecole polytechnique gave an analytical treatment of the funicular polygon (linked to the construction of suspension bridges). Why then – given that a French tradition of treating the funicular polygon graphically went back to the 18th century – did Culmann's new science experience such resistance there in the last third of the 19th century? After studying in detail how graphic statics, understood as a set of techniques, progressively spread in France, first in the milieu of civil engineers and then at all levels, Chatzis offers some interpretative keys, like the attachment to graphical methods, the relative lack of emphasis on projective geometry in the training of engineers, the perception of graphic statics as a German science, and the presence of alternative techniques. In conclusion, he reflects more generally on the phenomenon of reception – or rather the lack thereof

[2] cf also on this topic, Dominique Tournès *in* RHM 6, p. 127-161 and RHM 9, p. 181-252.

– of certain theories in certain communities. One of the factors Chatzis puts forward to explain this phenomenon resides in the treatise, which aims to describe the present state of a field by including all valid results of the past, but, at the same time, discarding from the mathematical memory all those results which have not been retained. In Chatzis's view, the form of knowledge transmission represented by the treatise has the potential – poorly understood by historians of mathematics – to consign certain theories to oblivion.

Pierre Lamandé, the author of the second paper in this issue, deals precisely with this matter of great didactical treatises in his study of Sylvestre-François Lacroix and his understanding of the number concept. Lamandé's interpretation of these treatises is, however, not the least turned to a forgotten past, but rather to the brilliant future they promise. In Lamandé's view, they presented a synthesis of mathematics at the end of the 18th century, including contemporary results which were put in order and deduced from simple principles. As such, they presaged the great advances of the 19th century. They paved the way forward. But there was certainly a price to be paid, namely, the amnesia Chatzis suggested. However, what interests Lamandé in the practice (as opposed to the form) of the treatise is what can link science, philosophy, and pedagogy. Wishing to highlight the coherence of Lacroix's epistemological attitude, he centers his analysis on the concept of number, which, in his eyes, unifies Lacroix's treatises, from arithmetic and algebra to differential and integral calculus, and including geometry, trigonometry and the application of algebra to geometry. The order adopted in Lamandé's presentation seems to reflect a hierarchy between the different sciences to which Lacroix devoted his influential treatises. The supremacy of algebra, conceived as theory of polynomials, is justified by the fact that this theory gives birth to new mathematical objects (negative as well as complex numbers).

This question of the hierarchy of the mathematical disciplines, already present in Chatzis's paper in the form of an opposition between geometry and analysis, explicitly structures the last paper in this issue. Luigi Maierù focuses on an important, even if poorly studied, seventeenth-century text, *Mechanica*, by John Wallis (1669-1671). According to Wallis, mechanics, as the science of movement, is part of geometry, which is, in turn, dominated by arithmetic and algebra. Wallis thus completely reversed the classical view which deemed geometry the most certain of all sciences. This hierarchy of the different sciences clearly reflected itself in the methods Wallis used in his mechanics. Maierù focuses on the calculation of centers of gravity, which is a most important part of the treatise. In order to obtain the centers of gravity for curvilinear figures and solids, Wallis employed a method based on the indivisibles created by Cavalieri, reinterpreted by Torricelli, developed by himself in his *Arithmetica infinitorum*, and tested in his geometrical works (on, for example, the cycloid). Wallis also applied to mechanics a tabular form of results concerning series with integer and fractional exponents from the *Arithmetica*. After translating problems related to centers of gravity into the algebraic language of series, he found the result he needed by simply reading the tables. Tested on simple problems, the answers to which were already known, this method was then applied to more and more complex and novel questions. Maierù provides several such examples in his paper.

The Editors-in-Chief