The Algorithmic Solution of the Original Euclidean Fermat's Last Theorem is a new work by Professor Malvina Baica, noted algebraic number theorist. It represents the culmination of her work in algebraic number theory as well as the solution to a famous classical problem. That culmination is no less than the proof of Fermat's Last Theorem within the classical Euclidean domain through the use of number theoretic tools that she developed from classical number theory sources. It should be observed that Professor Baica first presented her work as accomplished results in April 1994 at the same time that Andrew Wiles was approaching the Fermat problem form an entirely different direction. Initially Professor Baica's work was ignored in the atmosphere of excitement that surrounded the announcements of Professor Wiles, but in recent times more attention has been focused on Professor Baica's work. That is because her work is firmly embedded in number theory and her results spring naturally from the context in which Fermat first stated his problem. The work of Professor Wiles and his colleagues in elliptic curves theory is inventive, bold and deserving of great respect, but this work of Professor Baica's is a challenge to the elliptic curve theorists to prove that the equation $x^2 + y^2 = z^2$ has the same parametric solution in the geometry of elliptic curves as it does in Euclidean geometry

$$(x = u^2 - v^2,\ y = 2\,u\,v,\ z = u^2 + v^2 \quad \text{with } g\,c\,d\,(u, v) = 1).$$

Professor Malvina Baica, a member of the Mathematics Department at the University of Wisconsin-Whitewater was one of the last students of Professor Hasse, Bernstein and J. Schmidt in algebraic number theory at the University of Houston in Texas. In her graduate work she concerned herself with extending and making more powerful some of the important tools available to number theorists. I refer to the algorithms of Jacobi, of Perron and finally of Hasse and Bernstein that are all related to the Euclidean Algorithm. Concerned, as she was, in developing mechanism to identify the multiplicative group of units in an algebraic number fields, a problem associated with the periodicity of the Euclidean Algorithm, Dr. Baica was able to generalize the work of her predecessors to higher dimensions and to complex fields. Her work, **An Algorithm in a Complex Field and its Application to the Calculation of Units** (1984) was originally published in Volume 110, #1 of the Pacific Journal of Mathematics. The results published in that paper are now referred to as "Baica's Generalized Euclidean Algorithm".

Proofs of outstanding problems and conjectures in number theory are notoriously hard to achieve. Many results, when they do arrive, come from outside of the discipline of number theory. In fact, a whole field of mathematical investigation, analytic number theory, has evolved to bring the techniques of complex variable theory to bear upon number theory problems. Professor Baica, to the contrary, has achieved great results by working entirely within the number theory discipline. As a consequence, many of her results are not only important but have a natural elegance and style appropriate to that discipline.

A large number of solutions to classical problems have flowed from Dr. Baica's use of her algorithm. Starting with the n-dimensional equivalent of the Euler-Lagrange theorem, she went on to settle Hermite's problem, that is, to answer questions concerning the development of irrationals of arbitrary degree into periodic sequences.

This problem, now solved by Baica, has been open since the mid-nineteenth century. How to find the multiplicative group of units in an algebraic number field (isomorphic to a Galois group of a ring of characteristic zero) is known as Dirichlet's problem and that has been solved by Professor Baica. She was able to show that earlier developments in the subjects such as the calculation of the Halter-Koch and the Stender units are particular cases of her Generalized Euclidean Algorithm. Applications of Baica's algorithm following her solution of Dirichlet's problem allowed her to make advances in the Galois theory of polynomials.

Years ago, in discussions with her menthors, Hasse and Bernstein, the suggestion arose that the periodicity of number theory algorithms such as Baica was to later develop over the complex field had revelance to the solution of Fermat's problem. Her interest was also stimulated by her work on Hilbert's 10-th Problem in which the demand is made for the generalization of number theory algorithms to higher dimensions. The application of her Generalized Euclidean Algorithm in higher dimensional settings allowed her to conclude that the algorithm is not always periodic, a fact that prompted the further observation that the absence of periodicity except when one parameter is a multiple of another is equivalent to the conclusion of Fermat's Last Theorem.

Baica's Generalized Euclidean Algorithm and the results that Professor Baica has demonstrated flow from it are the subject of this volume. Her work has not only been a new insight into the solution of classical problems, but it has brought new organizing principles into the body of results that are algebraic number theory. Whether the subjects is the solution of Diophantine equations or new combinatorial identities or continued fractions, they are all illuminated by the methods developed by Professor Baica and her Generalized Euclidean Algorithm.

The Wiles approach to Fermat's Last Theorem has had overwhelming approval here and in the United Kingdom, even though questions of detail still remain. Baica's solution to the Fermat problem arrived at about the same time and it has been published in Europe. Her paper has been followed by additional papers of explication. The mathematical community now and for some time to come will be engaged in the task of comparing and evaluating these attacks on the Fermat problem. The effort of Professor Baica represents intellectual creativity of the highest order. It also represents enormous courage, the courage to confront the history of defeat head-on in which many mathematicians have come to grief. If mathematical research can be said to possess any aspect that can be named heroic, it must be the willingness to take on the largest problems and to expose one's work to criticism and analysis from all over the world. Andrew Wiles has done that. So has Malvina Baica.

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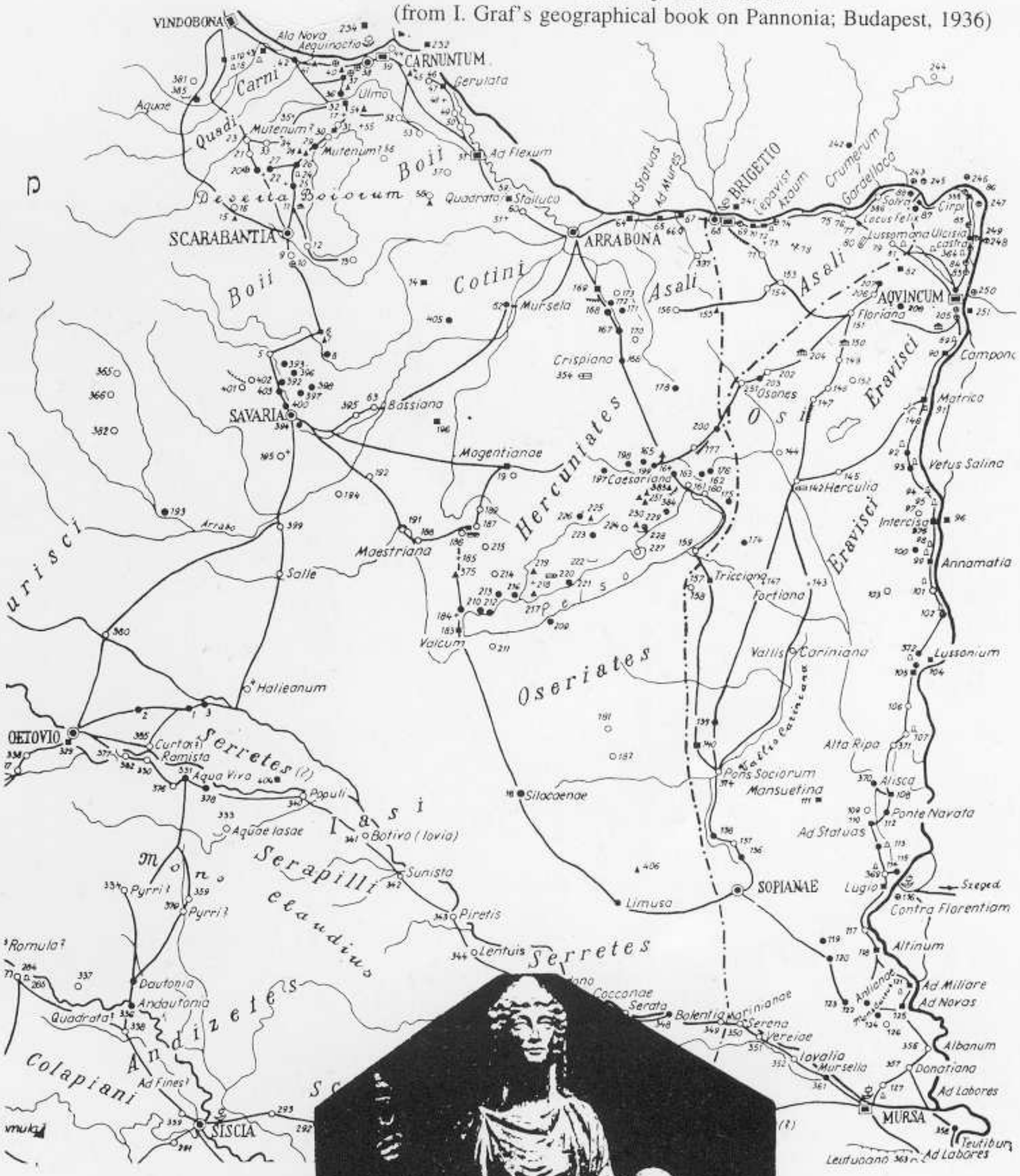
MAP of PANNONIA

(from I. Graf's geographical book on Pannonia; Budapest, 1936)



Statue of Dea Fortuna

(from the 3rd century) found in Aquincum

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