

Preface

Two volumes of *Selecta* contain many of Yakov Sinai's papers spanning more than half of a century. Some of these papers became classics a long time ago, some later, and others were published only recently.

Sinai has pioneered building bridges between the theory of dynamical systems and statistical mechanics. Often switching his main research interests from one field to another, he has demonstrated how the ideas and approaches in one area can enrich and bring new understanding to the other one. This *Selecta* clearly demonstrates how Sinai succeeded in transforming these two areas essentially into one with a unified vision and a wealth of tools and ideas. This singular vision can be traced in throughout these papers, including those on mathematical physics, fluid dynamics, and Partial Differential Equations.

Sinai is universally considered as the major architect of the modern theory of dynamical systems. Naturally, the first volume is dedicated to ergodic theory and dynamical systems. The part on entropy theory demonstrates the dramatic beginning of one of the most revolutionary discoveries in mathematics of the twentieth century (which allowed to build a unified theory of probabilistic and deterministic systems). The last paper in this part was published 40 years ago. Chaotic billiards is another flourishing area whose foundations were laid in a pioneering work of Sinai.

The first three papers in the "Dynamical Systems" section have dramatically changed this field by bringing together the concepts and approaches from statistical mechanics and dynamics. These ideas are at the heart of thermodynamic formalism, which has since become the basic approach to the studio of strongly chaotic (hyperbolic) systems. Other papers in this volume include an influential paper on Feigenbaum universality and more recent papers related to number-theoretic [OIC??] problems.

The selection of the papers for this edition was made by Sinai himself. He has also provided commentary for each paper. (It was a tough selection, and in our opinion quite a few of Sinai's classical papers were not included here.) The reader of this *Selecta* will be impressed by the variety of brilliant and unconventional ideas which revolutionized so many areas of mathematics and created so many exciting new directions. Sinai's enthusiasm and infinite optimism, multiplied by brilliance and consistent hard work, are responsible for that. Very often his intuition, taste, and enthusiasm have led to a goal visible at the time only by him. Sinai created new mathematical machineries, which were later refined and polished by others while he was busy with other discoveries.

This collection of papers of one of the giants of modern mathematics will serve as an inspiration for students, as well as for senior researchers, demonstrating that an exciting scientific journey through the various disciplines never ends if one is truly fascinated by mathematics. A piece of advice to the readers: Try to borrow some of Sinai's optimism while reading this *Selecta* and keep that optimism with you in your research.

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