

T. JERMY'S CONTRIBUTIONS TO THE FIELD OF BIOLOGICAL CONTROL

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Papers related to the field of biological control make up ca. 10% of TIBOR JERMY's scientific contributions. They date to the period of late 1950s and early 1960s when a renaissance of biological control research started all over the world. The meaning of biological control is used here in its widest sense, i.e., comprising the release of natural enemies and the use of irradiated or otherwise sterilized insects for genetic control purposes.

As research on new ways of pest control has always been on the agenda and specific features of reproductive physiology and feeding habits rendered some insect species more suitable for such purposes than others, many target species have been selected for studies in biological control. Pest species newly introduced to Europe, such as the American fall webworm (*Hyphantria cunea*), and the Colorado potato beetle (*Leptinotarsa decemlineata*) have also stimulated such efforts. The Hungarian Plant Protection Institute has been in charge of implementing new plant protection procedures based on its own research and that adapted from other investigators. Research on one of the promising approaches, the use of sterilized males, was co-ordinated with and partly supported by the International Atomic Energy Agency (IAEA, Vienna). Protocols of techniques were made available and small national projects were financed, thus providing the opportunity for international cooperation and participation in workshops as well as fostering contacts and friendship among scientists.

The success of genetic control in the USA had given an impetus for similar work throughout Europe. Specifically, the sterile insect technique (SIT) held great promise and ambitious programs were started. These programs needed a scientific staff with knowledge in the principles of radioentomology and proper training in dealing with irradiating devices and rearing facilities. Towards this end, TIBOR JERMY obtained training in a radioentomological course held in Florida. With hopes for eradicating serious agricultural pests, the government funded improvements in laboratory instruments and the construction of two insectaries for the Plant Protection Institute. It was at this time (1968) when the Zoology Department, headed by TIBOR JERMY, began a strong scientific development. The prospects for biological control seemed so good that TIBOR JERMY, who became the Director of the Plant Protection Institute in 1969, was given permission by the Ministry of Ag-

riculture to start building a new Institute unit to house the Zoological Department's genetic control programs and insect rearing facilities. The new unit was ca. 9 km distance from the old one, just at the border of Budapest, and was opened in 1973. JERMY not only initiated and organized the construction of the new unit, but greatly influenced the nature of research projects started there. The genetic control projects continued until the late 1970s.

During the period of 1960–1980, there were three major pests considered as subjects of SIT: the European cockchafer (*Melolontha melolontha*), the codling moth (*Cydia pomonella*) and the dry bean weevil (*Acanthoscelides obtectus*). Most of the work on the second species was carried out in the Keszthely laboratories (West Hungary) where occasionally SIT experts from Canada (M. D. PROVERBS) and USA (B. BUTT) – mediated by the IAEA – were also present to help the codling moth project. In addition to reducing the pest populations, the research on all three species provided a wealth of basic biological information. JERMY's own scientific interest and the international trends in biological control were in fortuitous coincidence and at the same time shaped the research profile of the Zoology Department. Besides radioentomological research, JERMY conducted studies on classic biological control by releasing natural enemies. As a summary of the knowledge and experience gained during this period, as well as guidance for future studies, he published the first comprehensive monograph on biological control in Hungarian (JERMY 1967).

INVESTIGATIONS ON NATURAL ENEMIES

JERMY's first investigations on the use of natural enemies were initiated in the 1950s during outbreaks of noctuid moths (*Euxoa* spp.) and the introduced fall webworm (*Hyphantria cunea*). The use of parasitic flies (Tachinidae) against these pests were considered (JERMY 1952, 1953, 1957a).

One of the most important pest insects of those times was the Colorado potato beetle (CPB). JERMY started numerous and varied investigations on the species (see also SZENTESI in this volume). Besides ecological and ethological studies, the possibility of using natural enemies against the CPB was also raised (JERMY & SÁRINGER 1955). Through international cooperation embracing mostly Comecon countries from the then communist Eastern Block, a project was launched to assess the potential of *Perillus bioculatus*, a predatory bug species of the CPB. The natural predator was brought in to Europe from the USA. The Keszthely laboratory was selected to coordinate the project because of its previous

research on the CPB (JERMY 1962*a, b, c, d, e*, 1980). TIBOR JERMY and GYULA SÁRINGER lead the efforts to evaluate the impact on the CPB of predatory bugs reared in the neighbouring countries, transferred to and released close to Keszthely in Hungary. The results were disappointing as there was no indication that the natural controlling agent was effective. JERMY evaluated the experiences (JERMY 1962*d, e*, 1967) and his arguments contributed to the abandonment of the project as not being effective. He concluded that the introduced bug was unable to establish a permanent population, partly because it had its own natural enemies.

RESEARCH ON STERILE INSECT TECHNIQUE

During the 1960s, important results were obtained with the SIT against the screw worm (*Cochliomyia hominivorax*) in the USA. As the method seemed economically feasible, similar projects were started worldwide. Hungary also joined in the international trend and at least three species-specific projects were initiated. JERMY took the lion's share of the organizing and research tasks. One of the target species was the cockchafer (JERMY & NAGY 1967*a, b*), another was the apple moth (JERMY 1969, JERMY & NAGY 1969, 1971), and the third was the dry bean beetle (SZENTESI & JERMY 1973). Discussions about possible solutions to the pest problems and invaluable research information on the biology and ecology of the target species are summarized by JERMY and colleagues (JERMY 1975, 1977, JERMY *et al.* 1978, NAGY & JERMY 1972). Acknowledging the experiences obtained in the SIT, a chapter on autocidal methods was written by Hungarian scientists in the book "Biological Control" edited by the Comecon countries (JERMY & NAGY 1974). This book, originally published in Russian, was subsequently translated into Hungarian (JERMY & NAGY 1975).

TOWARDS INTEGRATED PEST MANAGEMENT

Although the release of natural enemies and SIT programs were of limited success economically (JERMY *et al.* 1976), important biological and ecological knowledge was gathered that helped further the development of theories and even the start of new disciplines. These contributions were summarized by JERMY (1951, 1958, 1969, 1984, 1987). In his important essays on biological balance (JERMY 1957*b*, 1977), he pointed out and explained why, contrary to popular belief, a so-called "balance of nature" did not and would not exist. Another major

contribution was his book on biological control (JERMY 1967) that not only summarized contemporary data and findings, but for the first time, surveyed the history and early literature of Hungarian biological control. Finally, JERMY updated and summarized these concepts in his landmark essay on the meaning and applicability of integrated pest management in Hungary (JERMY 1975).

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