



PEERING INTO THE LIVING PAST CHRISTOPHER K. STARR

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Many biologists take an interest in social insects. Among these is a peculiar hard core marked by the conviction that this small radical minority of animals is, quite simply, the most interesting feature of the universe. I admit to being one of the true believers. Research on social insects is today a prominent field with all the features of a strong, well-organized scientific discipline. Most of my working life has been spent in tilling this very rich and fertile field of biology.

When I was about fifty – a good age for a substantial professional shift – after many years in insect sociobiology, I turned in earnest to the history of my own discipline. This area of scholarship, replete with interesting problems, has been largely neglected by historians of science. Much of my energies in the last several years have been devoted to re-making myself as a historian, while at the same time mining some of the rich veins that present themselves to view.

The history of insect sociobiology has been largely shaped by one particular circumstance. Of the eleven known species of honey bees, only one is found in the region where Western science originated. Not only was *Apis mellifera* the sole source of concentrated

sweetness available to early Europeans, it was also admired for its beautifully regular nest combs, its very clean abode, and as a model of hard work and good government. These features played a major role in drawing scientific attention to *A. mellifera*, so that today it is the most intensively studied of all invertebrate animals and serves as a base of comparison for thousands of other social-insect species. If *A. mellifera* had not happened to be present in Europe, we can be certain that the study of social insects would have emerged much later and probably in very different form.

Of the many great biologists who have worked on honey bees the most important were the Dutch micro-anatomist Jan Swammerdam (1637–80), the Swiss experimenter François Huber (1750–1831) and the Silesian beekeeper Jan Dzierżon (1811–1906). My main focus during three months at the Wissenschaftskolleg has been to study the work of the latter two.

Huber, with a fine sense of experimental control, investigated the inner workings of the honey-bee colony far more intensively than anyone had done before. He is perhaps best known for analyzing the causes and process of swarming, by which new colonies arise. On the other hand, his beautifully systematic study of how the colony maintains a fresh atmosphere inside the tightly-enclosed hive has attracted very little comment. In this, Huber showed that a) ventilation is controlled by a negative-feedback mechanism, and b) different worker-bees have different capacities for fanning with their wings, thus allowing the colony a graded response to air condition. It was not until many decades later that these topics, as well as the larger concept of colony-level physiology, were back on the scientific agenda.

While Swammerdam and Huber are well known today, Dzierżon is undeservedly obscure outside of German-speaking honey-bee science and Silesian cultural history. Study of his life and work is somewhat complicated by the existence of two largely separate literatures, in German and Polish. Still, he merits much more scholarly attention.

The period of Dzierżon's greatest impact – approximately 1850–65 – coincided with a marked flowering and consolidation of honey-bee studies in Central Europe. It was a time in which local beekeeping unions proliferated, the All-German Beekeeping Congresses were initiated and grew in attendance, and a new journal, the *Bienen-Zeitung*, provided a forum for vigorous discussion. These fostered a broader conception of honey-bee science that went beyond the merely practical to embrace fundamental biological questions, especially those of reproduction. A key trigger in all this was an 1845 paper by Dzierżon in the *Bienen-Zeitung*, in which he sought to make sense of a number of puzzling observations via the radical hypothesis that male honey bees (drones) are derived from unfertilized eggs,

in contrast to the (female) queens and workers. This hypothesis – today generalized to the order Hymenoptera as a whole – gave rise to a controversy at the center of honey-bee biology in its heroic period.

I came to Berlin with a working hypothesis that has since become untenable. According to this, Dzierżon and his followers – chiefly the landed aristocrat August von Berlepsch (1815–77) and the noted zoologists Carl von Siebold (1804–85) and Rudolf Leuckart (1822–98) – formed a movement analogous to the later Psychoanalytic Movement in order to promote their views. There is no question that Dzierżonian theory and practice rapidly became the orthodoxy throughout Central Europe, but I have found no good evidence of an organized movement toward that end. In particular, the extensive archive in the Jan Dzierżon Museum in Kluczbork, Poland, shows no trace of caucusing among the main players. One is left to conclude that Dzierżon's hypothesis gained hegemony and made a true discipline of honey-bee biology simply by overcoming poorer with better science.

The key remaining question in this area is the particular conditions in Central Europe that favoured the rise of honey-bee biology during this period. And why in German-speaking Europe rather than Britain or France? The answer almost certainly lies not in any difference in knowledge about honey bees and their management but in the prevailing social conditions.