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Coordination of interdisciplinary Research: a Tribute to Professor Vittorio Delucchi

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To many, the rules of the scientific method may appear formal, rigid and cold, but in the arts, artists are presumably allowed free rein to break with tradition. In fact, the underpinning rules of both are formal, but within the limits of that rigor, it is the creative flair (*twinkle*) that distinguishes excellence among scientific and artistic works. So if I use artist and scientist interchangeably, the intent will be clear from the context.

Environmental and other problems are becoming more complex through the activities of man, and the science required to solve many of these induced problems is of necessity becoming increasingly *multi-disciplinary*. Teams of artists from many disciplines must be formed to paint the larger panorama required to solve these problems. This multi-disciplinary approach is especially appropriate in *applied ecology* which I define as the *science of managing ecosystems*. However, despite the needs of problem solving, individual scientists must be allowed freedom to paint their section of the canvas, but the resultant mosaic must still maintain form. No single person can hopefully master all of the disciplines required to design the system necessary to manage an ecosystem in an environmentally sound way, yet we must learn to manage them if we are to preserve them and possibly mankind itself.

In painting, of which I engage as an amateur, as in applied ecology of which I am a seasoned professional, simply mixing colors or by analogy people with different disciplinary skills does not assure a satisfactory outcome. Yet despite the obviousness of this analogy, bureaucrats in government research institutions and University administrators continue to assemble multi-disciplinary groups using top down methods to solve complex ecosystem problems – often with disastrous results. This approach fails to recognize that when many artists are involved, the individual will must willingly bend to the success of the overall goal, and that the whole must not simply be the sum of its parts; it must be greater for innovation to occur. As in music, the conductor must have more than talent and the confidence of the orchestra, the conductor must have creative genius if the gift of individual excellence is to be blended for the true beauty of the composer's work to emerge. For this to happen in science, synergism must occur, and to facilitate this, research leaders must arise who themselves are highly competent, and sufficiently confident to establish goals, oversee the design of research methods and have the administrative skills to create an appropriate environment for interdisciplinary science. This is the genius that Professor VITTORIO DELUCCHI brought to the ETH (Eidgenössische Technische Hochschule) Zurich, to the "Institut für Phytomedizin" and the "Institut für Pflanzenwissenschaften" that enabled multi-disciplinary agroecosystems research to gain a firm foothold there.

A SHORT HISTORY

In 1974, I gave a talk at the International Congress of Entomology in which I attacked the absurdity of the then current notion of Integrated Pest Manage-

ment (IPM). My position was, how could pests and agroecosystems be managed if one couldn't analyze the problem in a dynamic fashion – it required new methodologies and new paradigms. The proponents of IPM understood clearly the biology, but not the technical difficulties of the analyses. At the end of my talk, a smartly dressed gentleman came to me and introduced himself – he was Professor VITTORIO DELUCCHI. With a bright eyed smile that I have since learned is one of his trademarks and a thumbs up sign he indicated that there was common ground. Not long after that, he sent Dr. J. U. BAUMGÄRTNER to my laboratory and Dr. HANS HERREN to my former mentor the late Professor ROBERT VAN DEN BOSCH. Thus began 16 years of collaborative research between his research group at the ETH and the Division of Biological Control at the University of California, Berkeley. After BAUMGÄRTNER came Dr. BEAT WERMELINGER and later Dr. BENNO GRAF. The highly fruitful collaboration ranged from alfalfa in California to cotton in the Sudan, apple and grape in Switzerland, rice in Madagascar and cassava, cowpea and maize in West Africa. I was invited to serve on Ph. D. committees at the ETH and as a consultant in many capacities. Zurich became very familiar ground for me. Our cooperation was open, it allowed us to seek new collaborators independent of each other, but common to us both when the need arose to share them. We worked successfully to save the Africa Wide Biological Control of Cassava Mealybug Programme from bureaucratic ignorance and meddling. I was chair of the scientific advisory committee, but Professor DELUCCHI was the sage directing with a firm experienced hand – I was his student on the workings of science administration. Our collaboration was never formal and never informal, but it was highly productive. I am in his debt.

Professor DELUCCHI's record of providing opportunity for his students and others is exemplary. The group he currently heads at the ETH is probably the strongest field ecology group in Europe. The members of this group have contacts with research groups throughout the world. The apple program with Italian colleagues is a model for others to emulate, and of course their model for grape growth and development makes my previous work on this obsolete. I have been active with an amalgam of Professor DELUCCHI's former students and my own in work in West Africa on maize-cowpea-cassava projects. Our students collaborate on still other important projects, and all this occurs as Professor DELUCCHI remains quietly in the background orchestrating support and enthusiasm – in short making it possible. This cooperative efforts is a working model for true cooperative research. Who could have foreseen the results of that initial thumbs-up sign of encouragement – certainly not I.

But as Professor DELUCCHI prepares for retirement from the ETH, any observer must conclude that it is merely the transition from one career to a new one organizing a new European Laboratory of Biological Control and a new center for agricultural research in Paraguay. Professor DELUCCHI is a builder, a giver who approached these and other problems with an enthusiasm that has characterized a remarkable career as an educator, as a scientist in biological control, parasitoid taxonomy, IMP, systems ecology, as a scientific administrator, as a mover in international agriculture and now in the founding of new institutions. I wish him well in his new endeavors, and only add that I don't simply follow any leader willingly, but Professor DELUCCHI has *carte blanche* on my services in his new career in science.