INTRODUCTION

An introduction to Richard Ring

Richard Ring, who for many years taught and carried out research at the University of Victoria, is renowned for his friendly personality and respect for others, which make him a very effective teacher. During his career at the University of Victoria, he taught some 14 000 students in no fewer than 309 biology and entomology courses. He is noted for his diligence in helping students in the laboratory, for his ability to smoothly integrate the laboratory materials with the lectures, and for always being accessible and helpful. Many students have been inspired by Richard's hands-on approach and love for the subject to pursue entomology, and Richard always had students in his laboratory doing special projects. His many graduate students have gone on to successful and productive careers. Richard was recognized in 2003 with the Faculty of Science's Award for Teaching Excellence. Again emphasizing the importance of providing students with the right sorts of educational experiences, Richard was the driving force behind the co-operative education program in the Department of Biology at the University of Victoria. He pushed that program forward from its beginnings in the early 1980s until it reached a high growth phase in 1990. The value of these "co-op" placements, which combine academic knowledge with practical employment experience, is now widely recognized.

Richard has been involved with a wide variety of other University activities. His concern with service to students led him to contribute in the Department of Biology especially to course development. In a broader sphere, he organized University meetings (notably, in recent years, the annual Invertebrate Symposium) and represented the University at the Association of Canadian Universities for Northern Studies and in other organizations. He is a charter member and former president of The University Club of Victoria (formerly the Faculty Club), a favoured location for informal discussions about science.

Richard's wider service is well recognized too. He is always willing to answer general inquiries about insects from the public or media. As a member of the UVic Speakers Bureau, he spoke at schools and to the wider Victoria community about insects and science. He has been involved with the National Geographic Society, First Nations councils, and other organizations.

Richard has been no less active in professional service. He was the President of the Entomological Society of British Columbia in 1971 and 1983, a society in which he was granted lifetime membership in 2003, and the President of the Entomological Society of Canada in 1991–1992, a society to which he was elected a fellow in 2001. He is a member of the Entomological Society of America, the Canadian Society of Zoologists, the Royal Entomological Society of London, and the Society for Cryobiology, among others, and he regularly attends meetings of these organizations. He also has organized meetings himself: the International Symposium on Insect and Plant Cold Hardiness was held in Victoria in 1985 and 2000.

Richard is well known as a reviewer for primary journals, and he became Editor-in-Chief of *The Canadian Entomologist* in 2003. He was a valued member of the Scientific Committee of the Biological Survey of Canada from 1990 until 2002, where he contributed especially on Arctic matters. He was also especially helpful during visits to Victoria by Biological Survey representatives. Characteristically, during these visits he would provide opportunities for his students to be exposed to and discuss entomology in both formal and informal settings.

Despite his involvement in all of these activities, Richard has not neglected research. He has cooperated with many scientists, not only colleagues at the University of Victoria and graduate students, of course, but also other people from several countries working especially in cold hardiness and polar biology (*e.g.*, Ring 1991; McCrae and Ring 1993; Winchester *et al.* 1993; Danks *et al.* 1994; Morewood and Ring 1998; DeBruyn and Ring 1999). In 1988 he visited the Antarctic as part of an international team to study the adaptations of insects on South Georgia (*e.g.*, Block *et al.* 1988; Sømme *et al.* 1989*a*, 1989*b*; Ring *et al.* 1990). Other research topics include ancient forest biodiversity (*e.g.*, Ring and Winchester 1996; Winchester and Ring 1996*a*, 1996*b*, 1999; Winchester *et al.* 1999). He has also been involved in many

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presentations, poster displays, and discussions at international conferences in Australia, Canada, Czech Republic, Italy, Scandinavia, the United Kingdom, and the United States.

Richard's research contributions cover a number of areas that are relevant to the subject of this symposium. Early on, he studied diapause. More recently, he quickly appreciated the significance of work on climate change and biodiversity, conducted work on those themes in cooperation with other scientists, and encouraged graduate students in those areas. In particular, he has addressed key features of insect cold hardiness and Arctic biology. For example, working on scolytid beetles, he confirmed that one species can have multiple protective or antifreeze compounds (Ring 1977). He was the first to discover that an Arctic species of *Rhabdomyia* (Cecidomyiidae) could remain unfrozen even at extraordinarily low temperatures (Ring 1981, 1982, 1983; Ring and Tesar 1981). He found a beetle (in the genus *Pytho*, Pythidae) that can tolerate being frozen but, unlike most freezing-tolerant species, which freeze quite readily, remains unfrozen until the temperature is very low (Ring 1982). Some species in the family Pythidae survive freezing as both larvae and adults (Ring and Tesar 1980). Another beetle species collected through Arctic fieldwork (*Xylophaga* sp., Xylophagidae) survives freezing but, strangely, lacks the usual antifreeze compounds (Ring 1981, 1983). Richard also quickly saw the significance of links between adaptations for cold hardiness and adaptations for resisting dehydration. Experimental results and wider discussions helped to consolidate general ideas about cold hardiness and dehydration as well as the role played by trehalose, an important protectant molecule against both cold and desiccation (Ring *et al.* 1990; Ring and Danks 1994, 1998).

Richard's insights stem partly from his grasp of the variety and complexity of the adaptations for cold hardiness, as exemplified by an instructive overview he published years ago (Ring 1980) in which he treated the significance of different temperature levels and many other elements. His contributions to these areas of study remain relevant for understanding insect cold hardiness and for the allied themes of adaptation to difficult environments.

Richard therefore has a wide legacy. It includes his research contributions, the fruits of his extensive teaching efforts, and the results of his many professional liaisons with others.

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INTRODUCTION

Présentation de Richard Ring

Richard Ring, qui a été pendant plusieurs années professeur et chercheur à l'University of Victoria, est connu pour sa personnalité attachante et son souci des autres, ce qui en fait un excellent enseignant. Durant sa carrière à l'University of Victoria, il a donné pas moins de 309 cours en biologie et en entomologie et enseigné à quelque 14 000 étudiants. On lui reconnaît une diligence pour aider les étudiants au laboratoire, un souci d'intégration des travaux pratiques et des leçons théoriques, ainsi qu'une grande disponibilité et un désir d'épauler les autres. Plusieurs étudiants ont été marqués par l'approche directe et l'enthousiasme de Richard pour l'entomologie au point de vouloir continuer leurs études dans ce domaine; il y a toujours eu des étudiants dans son laboratoire qui menaient des recherches indépendantes. Ses nombreux étudiants de cycles supérieurs poursuivent des carrières brillantes et productives. Richard a, d'ailleurs, reçu en 2003 le prestigieux prix de la faculté des sciences pour l'excellence de son enseignement. Toujours soucieux d'exposer les étudiants à des expériences éducatives appropriées, Richard a été l'âme du programme coopératif du département de biologie de l'University of Victoria. Il a appuyé le programme depuis ses débuts dans les années 1980 jusqu'à ce que celui-ci atteigne une forte croissance en 1990. La valeur de ces programmes « coopératifs » qui combinent le savoir académique et l'expérience pratique du travail est aujourd'hui partout reconnue.

Richard s'est impliqué dans d'autres activités universitaires. Son souci pour les étudiants se reflète dans son action au niveau du département de biologie, particulièrement dans l'élaboration des programmes. Il a organisé, au sein de l'université, de nombreuses réunions, en particulier ces dernières années, un symposium annuel sur les invertébrés. Il a représenté son institution à l'Association universitaire d'études nordiques et d'autres organisations. Il est membre fondateur et ex-président du club des professeurs (aujourd'hui University Club of Victoria) sur le campus, un lieu privilégié de discussions scientifiques informelles.

Son rayonnement s'étend bien au delà du campus. Il est toujours disponible pour répondre aux questions du public et des médias sur les insectes. Il a fait de nombreuses conférences sur les insectes et la science pour les écoles et les organismes communautaires de Victoria, comme membre du « bureau des conférenciers » institué par l'université. Il a collaboré avec la National Geographic Society, les conseils des Premières nations et d'autres organismes.

Richard a aussi de nombreuses activités professionnelles; il a été président de la Entomological Society of British Columbia (1971 et 1983) dont il est devenu membre à vie en 2003 et président de la Société d'entomologie du Canada (1991–1992) dont il a été élu « fellow » en 2001. Il est membre, entre autres, de l'Entomological Society of America, de la Société canadienne des zoologistes, de la Royal Entomological Society of London, de la Society for Cryobiology et il participe régulièrement à leurs réunions. Il a lui-même organisé des réunions scientifiques: en 1985 et en 2000, le symposium international sur la résistance au froid chez les insectes et les plantes (International Symposium on Insect and Plant Cold Hardiness) s'est tenu à Victoria.

Richard a souvent servi de réviseur pour des revues de recherche et il est récemment devenu directeur général de la revue *The Canadian Entomologist* en 2003. Il a été un membre apprécié de la Commission biologique du Canada de 1990 à 2002, où il servait de spécialiste des questions arctiques. Son aide a été particulièrement précieuse lors des visites de représentants de la Commission biologique à Victoria; il organisait, à ces occasions, des réunions formelles et informelles pour permettre aux étudiants d'être exposés à l'entomologie et d'en discuter.

Malgré toutes ces activités, Richard est loin d'avoir négligé sa recherche. Il a collaboré avec de nombreux scientifiques — des collègues de l'université de Victoria et des étudiants de cycles supérieurs, bien sûr, mais aussi avec des chercheurs de plusieurs pays intéressés surtout à la résistance au froid et à la biologie polaire (*e.g.*, Ring 1991; McRae et Ring 1993; Winchester *et al*. 1993; Danks *et al*. 1994; Morewood et Ring 1998; De Bruyn et Ring 1999). Comme

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membre d'une équipe internationale, il a visité l'Antarctique en 1988 pour étudier les adaptations des insectes en Géorgie du Sud (*e.g.*, Block *et al*. 1988; Sømme *et al*. 1989*a*, 1989*b*; Ring *et al*. 1990). Il s'est aussi intéressé à la biodiversité des forêts anciennes (*e.g.*, Ring et Winchester 1996; Winchester et Ring 1996*a*, 1996*b*, 1999; Winchester *et al.* 1999). Il a fait des présentations, préparé des affiches et participé à des discussions à des conférences internationales en Australie, au Canada, aux États-Unis, en Italie, en République Tchèque, au Royaume-Uni, en Scandinavie et ailleurs.

Les contributions scientifiques de Richard couvrent plusieurs domaines qui sont d'intérêt pour ce symposium. Il a étudié un moment la diapause; plus récemment, il a reconnu l'intérêt considérable à travailler sur le changement climatique et la biodiversité et il a collaboré dans ces domaines avec d'autres chercheurs; il a encouragé ses étudiants des cycles supérieurs à s'y intéresser. Il a, en particulier, exploré des facettes fondamentales de la résistance au froid chez les insectes et de la biologie arctique. Travaillant, par exemple, sur les coléoptères scolytidés, il a pu confirmer qu'une espèce possède de multiples produits protecteurs ou antigels (Ring 1977). Il a été le premier à découvrir que l'espèce arctique *Rhabdomyia* sp. (Cecidomyiidae) peut rester sans geler, même à des températures extraordinairement basses (Ring 1981, 1982, 1983; Ring et Tesar 1981). Il a trouvé un coléoptère (du genre *Phyto*, Phytidae) qui peut tolérer le gel; mais contrairement à la plupart des espèces tolérantes au gel qui gèlent très facilement, cette espèce ne gèle que lorsque la température est très basse (Ring 1982). Certaines espèces de la famille des Phytidae survivent au gel, tant à l'état larvaire qu'à l'état adulte (Ring et Tesar 1980). Une autre espèce de coléoptère (*Xylophaga* sp., Xylophagidae), récoltée lors de travaux sur le terrain dans l'arctique, survit au gel, mais curieusement sans posséder aucun des produits antigels courants (Ring 1981, 1983). Richard s'est aussi vite aperçu de l'intérêt des liens entre les adaptations de la résistance au froid et les adaptations de la résistance à la déshydratation. Des résultats expérimentaux et des discussions élargies lui ont permis de contribuer à l'établissement des concepts généraux sur la résistance au froid et la déshydratation, ainsi que sur le rôle du tréhalose, une molécule de protection importante contre le froid et la dessiccation (Ring *et al*. 1990; Ring et Danks 1994, 1998).

Les perspectives nouvelles apportées par Richard résultent en partie de sa compréhension de la variété et de la complexité des adaptations pour la résistance au froid, comme il apparaît dans une rétrospective intéressante qu'il a publiée il y a quelques années (1980) sur l'importance des différents seuils thermiques et d'autres éléments. Ses contributions à ces domaines de recherche sont d'une grande pertinence pour la compréhension de la résistance au froid chez les insectes et les domaines connexes des adaptations aux environnements rigoureux.

La contribution globale de Richard est très étendue et comprend ses différents travaux de recherche, les retombées considérables de son travail d'enseignant et les résultats de ses nombreuses interactions professionnelles.

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