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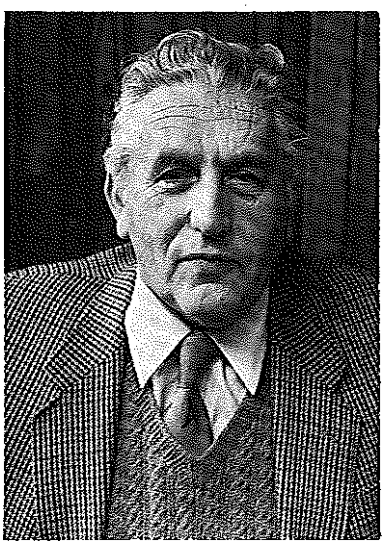

ISAAC HARPAZ
1924–1987

Isaac Harpaz, Professor of Entomology and long-time Chairman of the Department of Entomology at the Faculty of Agriculture of the Hebrew University of Jerusalem, at Rehovot, passed away suddenly on May 7, 1987.

Born in Tel Aviv on December 5, 1924, Isaac was brought up in the town of Kefar Sava. Having graduated from the prestigious Herzliya High-School in Tel Aviv in 1941, he enrolled in the newly-established Institute for Agricultural Studies of the Hebrew University (now the Faculty of Agriculture), Rehovot, where he received his M.Sc. in 1947. That year he was appointed Assistant in Entomology, but his studies were interrupted by active military service during Israel's 1948-1949 War of Independence. In 1953 he received his Ph.D. in agricultural entomology from the Hebrew University. Both his M.Sc. thesis, on the bionomics of the spotted alfalfa aphid, *Therioaphis maculata*, and his Ph.D. thesis, on the ecology, phenology and taxonomy of graminicolous aphids, were supervised by the late Professor F.S. Bodenheimer. He was appointed Lecturer in Entomology at the Hebrew University, Rehovot, in 1955, and was promoted to Senior Lecturer in 1960, to Associate Professor in 1966, and to Professor of Entomology in 1971. He served as Chairman of

the Department of Entomology almost continuously from 1966 on, as Associate Dean of the Faculty of Agriculture in 1973-1974, and as its Dean in 1974-1977. In 1982 he was appointed first incumbent of the Morris and Helen Mauerberger Chair in Agricultural Entomology at the Hebrew University.

The following list of more than 130 research and review publications, including two books and several chapters in major treatises, provides some insight into the amazing scope and depth of Isaac's scientific and cultural interests. He was an outstanding economic entomologist, virologist, systematist, ecologist, historian of science. A leading expert on pest biology, he published extensively on the insect and mite pests of various crop and forest plants, including cereals, alfalfa, tomato, olive, grape and pine, as well as on snails as plant pests. His book, "Plant Pests of Israel", which he co-authored in 1969 with the late Professor Z. Avidov, is still the definitive text on agricultural entomology in Israel.

A staunch proponent of IPM, Isaac Harpaz placed special emphasis on cultural and other non-chemical methods of pest control. To cite just one example, when the alfalfa seed chalcid, *Bruchophagus roddi*, became a serious pest in Israel, his ecological and phenological studies led him to devise a simple yet effective method of cultural control, by postponing seed production to evade the main period of the pest's attack. In 1966 he was appointed member of the FAO/UNEP International Panel of Experts on Integrated Pest Control, on which he served for 17 years. In 1974 he founded the Hebrew University Center for Integrated Pest Control Research, of which he was Chairman until the time of his death. The prestigious Rothschild Prize was awarded to him in 1986 in recognition of his outstanding contributions to IPM and plant protection.

A period of post-doctoral studies with Dr. Kenneth M. Smith at the Molteno Virus Research Unit of Cambridge University in 1955-1956 marked the beginning of Isaac's life-long interest in the interactions of insects and viruses. He was the first scientist in Israel to devote himself to both aspects of this important area – transmission of plant viruses by insects on the one hand, and virus diseases of insects on the other hand. He became an expert and a leader in both aspects, and the world-wide reputation he achieved was attested to by his membership in practically every international panel concerned with these subjects.

His careful and ingenious investigations of insect-borne virus diseases are best illustated by his studies of maize rough dwarf virus (MRDV), a major disease of maize the causative agent of which he found to be transmitted by a planthopper, *Laodelphax striatella*. The title of his classic 1972 book, "Maize Rough Dwarf, a planthopper virus disease affecting maize, rice, small grain and grasses", illustrates the originality of Isaac's thinking. He argued that the virus is primarily a pathogen of sap-feeding planthoppers, whereas graminaceous plants serve only as intermediary hosts for its passage from one planthopper to another. Old-World cereals and grasses have "learnt to live" with the virus, but when American hybrid maize was introduced into the Old World, the virus flared up to epiphytotic proportions. Here, again, cultural methods provided the key to effective control. Isaac and his co-workers discovered that temperatures above 24°C prevented the propagation of the virus in its planthopper vector. Therefore, the mere delaying of maize planting dates until such time that the seedlings emerged from the soil when the mean air temperature exceeded 24°C,

resulted in reduction of MRDV incidence to negligible proportions. Among his other projects, Isaac also led the research team that discovered that the devastating "tomato leaf curl" disease is caused by a virus transmitted by the tobacco whitefly, *Bemisia tabaci*..

As an insect pathologist, Isaac's attention was drawn to the enormous possibilities of controlling insect pests biologically, by causing pre-meditated viral infections. His studies of the Egyptian cotton worm, *Spodoptera littoralis*, indicated that the larvae of this important pest harbor latent baculoviruses, which changes in environmental conditions, especially in population density, may cause to burst out and start an epizootic. He also attempted to develop effective viral pesticides and control methods, by protecting the virus particles from damaging ultra-violet radiation and by designing bait formulations.

Far beyond the immediate scientific fields of agricultural entomology and virology, Isaac Harpaz was a man of broad cultural interests, including the history of entomology and the place of entomology in human culture. In 1973, for a volume on the history of entomology published by *Annual Reviews*, he wrote an excellent article on early entomology in the Middle East. Then, for the 1984 volume of the *Annual Review of Entomology*, he wrote a biography of his former teacher, F.S. Bodenheimer, that can serve as a model of historical writing at its best. The depth of his knowledge of Hebrew scriptures, of the history, geography and culture of Israel, was amazing, as was his phenomenal gift for languages. Fluent in Hebrew, English and Arabic, he could read and speak several others as well, and was always willing to help with a translation, with an appropriate term, with sound advice on any scientific or cultural matter, and always with patience and good spirits.

Isaac Harpaz was unquestionably one of Israel's most prominent entomologists on the international scene. His first sabbatical leave, in 1960/1961, was divided between the Department of Plant Pathology, University of Wisconsin, Madison, and the Department of Entomology, University of California, Riverside. In later years he was Visiting Professor of Entomology at the University of California, Berkeley (1969/1970), Visiting Senior Research Fellow at Jesus College, Oxford, and Visiting Professor at the Hope Department of Entomology, Oxford University (1977/1978), Consultant to the South African Department of Agriculture at the Plant Protection Research Institute, Pretoria (1979/1980), Consultant to the Interamerican Institute of Agricultural Sciences, Organization of American States, in Argentina (1982), and Visiting Professor of Entomology, University of Stellenbosch, South Africa (1984). His scholarly contributions to numerous congresses, symposia and seminars were always highly appreciated. He also served on the Editorial Boards of *Current Topics in Vector Research* and *Phytoparasitica*, the Israel Journal of Plant Protection Sciences.

A founding member of the Entomological Society of Israel, Isaac Harpaz was one of the main moving forces of that society. At the time of his death he served as its President. He was also active in numerous committees in Israel, including the Curricula Committee in Agriculture of the Ministry of Education and Culture, of which he was appointed Chairman in 1974, the Academic Committee of the Harry S. Truman Research Institute at the Hebrew University (1974), and the Council of the Wolf Foundation (1976).

Isaac was a gifted teacher, admired by his numerous students for his

encyclopedic knowledge as well as for his wit and charm as a lecturer. Courses he taught at the Faculty of Agriculture, Rehovot, included General Entomology, An Introduction to Pest Management, Pests of Field, Vegetable and Flower Crops, Insect Pathology, and Vectors of Plant Pathogens. He also served as supervisor of many graduate students for the Master and Doctor degrees. Many of his former students now occupy leading positions in Israel.

Isaac is survived by his wife Yocheved (Joan) Harpaz (née Levy), his son Dr. Sheenan M. Harpaz, an aquaculture specialist, and two grandchildren.

With the passing of Isaac Harpaz we have lost an exemplary scholar, a leading researcher, a wise counsellor, an outstanding teacher, a talented administrator and a kind, modest, helpful friend. His students, colleagues and many friends will painfully miss him in the years to come.

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ISAAC HARPAZ 1924 – 1987

LIST OF PUBLICATIONS

A. Research Papers and Books (asterisked)

1. Harpaz, I. 1950. On three new Eriophyid-mite pests. *Hassadeh (Tel-Aviv)*, 30:316-318 (in Hebrew).
2. Bodenheimer, F.S., and Harpaz, I. 1951. Holometabolic development in the males of Coccoidea. *Bull. Res. Counc. Israel*, 1:133-135.
3. Avidov, Z., Harpaz, I., and Mohrer, I. 1953. Experiments in controlling the olive fly. *Agr. Res. Sta. Rehovot, Bull.* No. 59, pp. 15-22.
4. Harpaz, I. 1953. Ecology, phenology and taxonomy of the aphids living on Graminaceous plants in Israel. Ph.D. thesis, Hebrew University, Jerusalem, 141 pp. (in Hebrew with a summary in English).
5. Harpaz, I. 1954. The clover seed chalcid (*Bruchophagus gibbus* Boh.), a new pest of alfalfa and clover seeds in Israel. *Hassadeh (Tel-Aviv)*, 34:509-510 (in Hebrew).
6. Bodenheimer, F.S., and Harpaz, I. 1955. Description of the various stages of *Matsucoccus josephi n. sp. In* F.S. Bodenheimer and S. Neumark, The Israel pine *Matsucoccus*, Kiryath Sepher, Jerusalem, pp.12-22.
7. Harpaz, I. 1955. Notes on the Eriophyid mites of Israel. *Bull. Res. Counc. Israel*, 5B:61-68.
8. Avidov, Z., Harpaz, I., and Mohrer, I. 1955. Control experiments against *Dacus oleae* Gmel. in 1954. *Hassadeh (Tel-Aviv)*, 35:580-582 (in Hebrew).
9. Harpaz, I. 1955. Bionomics of *Therioaphis maculata* (Buckton) in Israel. *J. Econ. Entomol.*, 48:668-671.
10. Avidov, Z., Mohrer, I., and Harpaz, I. 1955. Control of the olive fly with dieldrin and methoxychlor in Israel. *FAO Plant Protect. Bull.*, 3:145-147.
11. Harpaz, I. 1956. Note on the occurrence of *Apion flavofemoratum* Herbst. var. *croceifemoratum* Gyll. (Coleoptera: Curculionidae) in Israel. *Entomol. Ber. (Amsterdam)*, 16:15-15.
12. Avidov, Z., Mohrer, I., and Harpaz, I. 1956. Experiments in olive fly control during 1955. *Hassadeh (Tel-Aviv)*, 36:702-703, 806-809 (in Hebrew).
13. Harpaz, I., Minz, G., and Nitzany, F. 1958. Dwarf disease of maize. *FAO Plant Protect. Bull.*, 7:43

14. Harpaz, I. 1958. Bionomics of the 11-spotted Ladybird beetle (*Coccinella undecimpunctata* L.) in a subtropical climate. *Proc. 10th Intern. Congr. Entomol. Montreal*, 1956, 2:657-659.
15. Avidov, Z., Moore, I., and Harpaz, I. 1958. Dieldrin versus diazinon in the control of the olive fly (*Dacus oleae* Ginel.) in Israel. *Ktavim*, 8:117-126.
16. Slaye, G., Harpaz, I. and Pinthus, M. 1958. Effect of soil insects on sorghum germination. *Hassadeh (Tel-Aviv)*, 38:401-403 (in Hebrew).
17. Harpaz, I., and Lensky, Y. 1959. Experiments on bee repellents. *Bee World*, 40:146-153.
18. Harpaz, I., and Slaye, G. 1959. Control of soil insects in sorghum. *Hassadeh (Tel-Aviv)*, 39:759-760 (in Hebrew).
19. Harpaz, I. 1959. Needle transmission of a new maize virus. *Nature (London)*, 184:77-78 B.A.
20. Harpaz, I. 1959. Autumn attack of the olive fruit fly and its control. *Hassadeh (Tel-Aviv)*, 39:1250-1254 (in Hebrew).
21. Loebenstein, G., and Harpaz, I. 1960. Virus diseases of sweet potatoes in Israel. *Phytopathology*, 50:100-104.
22. Harpaz, I. 1960. The dwarf virus disease of maize. *Hassadeh (Tel-Aviv)*, 40:732-733 (in Hebrew).
23. Harpaz, I., and Bernstein, Z. 1960. The grape bud mite, a new pest in our vineyards. *Alon Ha'notea*, Vol. 14, No. 5, pp. 16-20 (in Hebrew).
24. Harpaz, I., Rosen, D., and Applebaum, S.W. 1960. Laboratory Manual in Entomology. Academon, Jerusalem, 41 pp. (in Hebrew).
25. Harpaz, I. 1961. Some observations on the role of diapause in the phenology of insects in semi-arid zones. *In* N. Grossowicz (ed.), Cryptobiotic Stages in Biological Systems. Elsevier, Amsterdam, pp. 154-158.
26. Harpaz, I., and Applebaum, S.W. 1961. Accumulation of asparagine in maize plants infected by maize rough dwarf virus, and its significance in plant virology. *Nature (London)*, 192:780-781.
27. Harpaz, I. 1961. *Calligypona marginata*, the vector of maize rough dwarf virus. *FAO Plant Protec. Bull.*, 9:144-147.
28. Harpaz, I., and Oseri, Y. 1961. Control of the white garden snail in Israel. *Pest Technol.*, 4:41-43.
29. Harpaz, I., and Oseri, Y. 1961. Crop-damaging snails in Israel and their control. Hebrew University Faculty of Agriculture and Citrus Marketing Board of Israel, 44 pp. (in Hebrew with a summary in English).
30. Harpaz, I., and Bernstein, Z. 1962. Occurrence of the bud-mite strain of *Eriophyes vitis* (Pgst.) in the Old World and the nature of its damage to grape vines. *Proc. XIth Intern. Congr. Entomol. Vienna, 1960*, 2:47-48.
31. Birk, Y., Harpaz, I., Ishaaya, I., and Bondi, A. 1962. Studies on proteolytic activity of the beetles *Tenebrio* and *Tribolium*. *J. Insect Physiol.*, 8:417-429.
32. Cohen, S., Nitzany, F.E., and Harpaz, I. 1963. Experiments in controlling tomato yellow leaf curl virus. *Hassadeh (Tel-Aviv)*, 43:576-578 (in Hebrew).
33. Harpaz, I. 1963. An association between Jehovah's ant, *Crematogaster jehovae* For. (Hymenoptera: Myrmicidae), and the fig wax-scale, *Ceroplastes rusci* L. (Rhynchota: Coccidae), on grapevines in Israel. *Entomol. Ber. (Amsterdam)*, 23:44-45
34. Harpaz, I. 1963. L'emploi de procédés culturaux, plutôt que chimiques, dans la lutte contre les parasites animaux et les maladies des cultures dans les régions tropicales peu développées. *J. Agr. Trop. Bot. Appl.*, 10:603-611.
35. Applebaum, S.W., Birk, Y. Harpaz, I., and Bondi, A. 1964. Comparative studies on proteolytic enzymes of *Tenebrio molitor* L. *Comp. Biochem. Physiol.*, 11:85-103.
36. Harpaz, I. 1964. Hostplant-vector and hostplant-virus relationships in the rough dwarf disease of maize. *Maydica*, 9:16-20.
37. Sela, I., Harpaz, I., and Birk, Y. 1964. Separation of a highly active anti-viral factor from virus-infected plants. *Virology*, 22:446-451.
38. Harpaz, I., and Ben-Shaked, Y. 1964. Generation-to-generation transmission of the nuclear polyhedrosis virus of *Prodenia litura* (Fab.). *J. Insect Pathol.*, 6:127-130.
39. Harpaz, I., and Klein, M. 1964. Polyphenoloxidase activity in healthy maize plants and in those infected by the maize rough dwarf virus (MRDV). *Experientia*, 20:274-275.
40. Harpaz, I. 1964. On three "leafhopper"-borne plant viruses from England. *In* C. Blattny (ed.), Plant virology. Czechoslovak Academy of Sciences, Prague, pp. 186-194.
41. Harpaz, I. 1964. Comparative host-range, symptomatology and physical properties of *Arabis* mosaic virus (AMV) from different sources. *In* C. Blattny (ed.), Plant virology. Czechoslovak Academy of Sciences, Prague, pp. 222-228.

42. Cohen, S., and Harpaz, I. 1964. Periodic, rather than continual acquisition of a new tomato virus by its vector, the tobacco whitefly (*Bemisia tabaci* Gennadius). *Entomol. Exp.Appl.*, 7:155-166.
43. Applebaum, S.W., Harpaz, I., and Bondi, A. 1964. Amylase secretion in the larvae of *Prodenia litura* F. *Comp. Biochem. Physiol.*, 13:107-111.
44. Harpaz, I. 1964. Inconsistency in the vector relations of the citrus tristeza virus. *Riv. Patol. Veget.*, 4:549-558.
45. Harpaz, I., Zlotkin, E., and Ben-Shaked, Y. 1965. On the pathology of the cytoplasmic and nuclear polyhedroses of the Cyprus processionary caterpillar (*Thaumetopoea wilkinsoni* Tams). *J. Invertebrate Pathol.*, 7:15-21.
46. Klein, M., and Harpaz, I. 1965. Proteolytic activity in maize leaves. *Phytochemistry*, 4:327-332.
47. Sela, I., Harpaz, I., and Birk, Y. 1965. Suppression of virus infectivity in diseased plant tissue following treatment with antiviral factor from virus-infected plants. *Virology*, 25:80-82.
48. Harpaz, I., and Klein, M. 1965. Occurrence of barley yellow dwarf virus (BYDV) in Israel. *Plant Dis. Reptr.*, 49:34-35.
49. Harpaz, I., Vidano, C., Lovisolo, O., and Conti, M. 1965. Indagini comparative su *Javesella pellucida* (Fabricius) e *Laodelphax striatellus* (Fallén) quali vettori del virus del nanismo ruvido del mais ("Maize rough dwarf virus"). *Atti Accad. Sci. Torino*, 99:885-901.
50. Harpaz, I., and Zlotkin, E. 1965. A nuclear polyhedrosis virus of the safflower leaf worm, *Heliothis peltigera* Schiffermüller (Lepidoptera: Noctuidae). *Ann. Soc. Entomol. France (N.S.)*, 1:963-972.
51. Harpaz, I., and Cohen, S. 1965. Semipersistent relationship between cucumber vein yellowing virus (CVYV) and its vector, the tobacco whitefly (*Bemisia tabaci* Gennadius). *Phytopathol. Z.*, 54:240-248.
52. Sela, I., Harpaz, I., and Birk, Y. 1966. Identification of the active component of an antiviral factor isolated from virus-infected plants. *Virology*, 28:71-78.
53. Harpaz, I. 1966. Further studies on the vector relations of the maize rough dwarf virus (MRDV). *Maydica*, 11:18-23.
54. Harpaz, I., and Gerson, U. 1966. The "bicomplex" of the olive fruit fly (*Dacus oleae* Gmel.), the olive fruit midge (*Prolasioptera berlesiana* Paoli), and the fungus *Macrophoma dalmatica* Berl. & Vogl. in olive fruits in the Mediterranean Basin. *Scripta Hierosolymitana*, 18:81-126.
55. Harpaz, I., and Klein, M. 1966. Chemical changes induced in maize plants by the maize rough dwarf virus (MRDV). *Scripta Hierosolymitana*, 18:127-142.
56. Ben-Shaked, Y., and Harpaz, I. 1966. Protection of a susceptible insect host against a nuclear-polyhedrosis virus by ether extracts from insect larvae. *J. Invertebrate Pathol.*, 8:283-285.
57. Zimmerman-Gries, S., and Harpaz, I. 1967. Spread of potato virus Y (PVY) in relation to aphid population trends in potato fields in Israel. *Eur. Potato J.*, 10:108-115.
58. Kislev, N., Harpaz, I., and Klein, M. 1968. Electron-microscopic studies on the cytopathology of maize plants infected with the maize rough dwarf virus (MRDV). *Acta Phytopathol. Acad. Sci. Hung.*, 3:3-12.
59. Klein, M., and Harpaz, I. 1968. The effect of infection with maize rough dwarf virus (MRDV) upon the proteolytic activity in maize plants. *Phytopathol. Z.*, 62:279-284.
60. Gerson, U., and Harpaz, I. 1968. Notes on gall-midges from Israel and their parasites. *Entomol. Ber. (Amsterdam)*, 28:144-148.
61. Kislev, N., Harpaz, I., and Zelcer, A. 1968. Structure of the nuclear polyhedrosis virus of the Egyptian cottonworm *Spodoptera littoralis* (Boisd.). *Proc. 4th Europ. Reg. Conf. Electron Microscopy, Rome, 1968*, 2:145-146.
62. *Avidov, Z., and Harpaz, I. 1969. Plant Pests of Israel. Israel Universities Press, Jerusalem, x + 549 pp.
63. Harpaz, I., Kislev, N., and Zelcer, A. 1969. Electron-microscopic studies on hemocytes of the Egyptian cottonworm, *Spodoptera littoralis* (Boisd.), infected with nuclear-polyhedrosis virus, as compared to noninfected hemocytes. I. Noninfected hemocytes, *J. Invertebrate Pathol.*, 14:175-185.
64. Kislev, N., Harpaz, I., and Zelcer, A. 1969. Electron-microscopic studies on hemocytes of the Egyptian cottonworm, *Spodoptera littoralis* (Boisd.), infected with nuclear-polyhedrosis virus, as compared to noninfected hemocytes. II. Virus-infected hemocytes. *J. Invertebrate Pathol.*, 14:245-257.
65. Harpaz, I., and Klein, M. 1969. Vector-induced modifications in a plant virus . *Entomol. Exp. Appl.*, 12:99-106.

66. Klein, M., and Harpaz, I. 1969. Changes in resistance of graminaceous plants to delphacid planthoppers induced by maize rough dwarf virus (MRDV). *Z. Angew. Entomol.*, 64:39-43.
67. Harpaz, I., Bar-Joseph, M., and Sela, I. 1969. Inhibition of tobacco mosaic virus (TMV) infectivity by the fungus Thielaviopsis basicola (Berk. & Br.) Ferr. *Ann. Appl. Biol.*, 64:57-64.
68. Kislev, N., Edelman, M., and Harpaz, I. 1969. DNA of the *Spodoptera littoralis* (Boisd.) caterpillar and of its nuclear polyhedrosis virus. *Israel J. Chem.*, 7:121 p. (Abstract).
69. Zimmerman-Gries, S., and Harpaz, I. 1970. Incidence of virus diseases in trials to grow foundation-stock seed potatoes in Israel. *Potato Res.*, 13:91-100.
70. Klein, M., and Harpaz, I. 1970. Heat suppression of plant-virus propagation in the insect vector's body. *Virology*, 41:72-76.
71. Kislev, N., Edelman, M., and Harpaz, I. 1971. Nuclear polyhedrosis viral DNA: Characterization and comparison to host DNA. *J. Invertebrate Pathol.*, 17:199-202.
72. Harpaz, I., and Rosen, D. 1971. Development of integrated control programs for crop pests in Israel, *In* C.B. Huffaker (ed.), Biological Control, Plenum Press, New York and London, pp. 458-468.
73. Antignus, Y., Sela, I., and Harpaz, I. 1971. Species of RNA extracted from tobacco and *Datura* plants and their differential sensitivity to actinomycin D. *Biochem. Biophys. Res. Commun.*, 44:78-88.
74. Rosen, D., Harpaz, I., and Samish, M. 1971. Two species of *Saissetia* (Homoptera: Coccidae) injurious to olive in Israel and their natural enemies. *Israel J. Entomol.*, 6:35-53.
75. *Harpaz, I. 1972. Maize Rough Dwarf, a planthopper virus disease affecting maize, rice, small grains and grasses. Israel Universiies Press, Jerusalem, xvi + 251 pp.
76. Marco, S., Cohen, S., Harpaz, I., and Birk, Y. 1972. *In vivo* suppression of plant virus transmissibility by an ant-TMV factor occurring in an inoculative vector's body. *Virology*, 47:761-766.
77. Harpaz, I. 1972. Viruses in maize. *Hassadeh (Tel-Aviv)*, 52:645-646 (in Hebrew).
78. Harpaz, I. 1972. Non-chemical control of the lucerne seed chalcid, *Bruchophagus roddi* Gussakowsky (Hymenoptera: Eurytomidae). *Abstr. 14th Int. Congr. Entomol., Canberra, August 1972*, pp. 240-241.
79. Harpaz, I. 1973. Early entomology in the Middle East. *In* R.F. Smith, T.E. Mittler, and C.N. Smith (eds.), History of Entomology, Annual Review Inc., Palo Alto, California, pp. 21-36.
80. Klein, M., Harpaz, I., Greenberger, A., and Sela, I. 1973. A mosaic disease of maize and sorghum in Israel. *Plant Dis. Reptr.*, 57:125-128.
81. Harpaz, I. 1973. Less-known vectors. *Abstr. 2nd. Int. Congr. Plant Pathol., Minneapolis, Sept. 1973*, No. 0809.
82. Tanne, E., Sela, I., and Harpaz, I. 1974. Transmission of grapevine leafroll virus to herbaceous plants. *Phytopathol. Z.*, 80:176-180.
83. Antignus, Y., Sela, I., and Harpaz, I. 1975. A phosphorus-containing fraction associated with antiviral activity in *Nicotiana* spp. carrying the gene for localization of TMV infection. *Physiol. Plant Pathol.*, 6:159-168.
84. Marco, S., Cohen, S., Harpaz, I., and Birk, Y. 1975. An anti-TMV factor in the tobacco whitefly after acquisition of tomato yellow leaf curl virus. *J. Insect Physiol.*, 21:1821-1826.
85. Tanne, E., Sela, I., Klein, M., and Harpaz, I. 1977. Purification and characterization of a virus associated with the grapevine leafroll disease. *Phytopathology*, 76:442-447.
86. Antignus, Y., Sela, I., and Harpaz, I. 1977. Further studies on the biology of an antiviral factor (AVF) from virus-infected plants and its association with the N-gene of *Nicotiana* species. *J. Gen. Virol.*, 35:107-116.
87. Weiss, M., Cohen, S., Marco, S., and Harpaz, I. 1977. Failure of sticky yellow traps to reduce aphid-borne virus incidence in squash. *Hassadeh (Tel-Aviv)*, 58:75-78 (in Hebrew).
88. Mozes, R., Antignus, Y., Sela, I., and Harpaz, I. 1978. The chemical nature of an antiviral factor (AVF) from virus-infected plants. *J. Gen. Virol.*, 38:241-249.
89. Harpaz, I., and Raccah, B. 1978. Nucleopolyhedrosis virus (NPV) of the Egyptian cottonworm, *Spodoptera littoralis* (Lepidoptera, Noctuidae): Temperature and pH relations, host range, and synergism. *J. Invertebrate Pathol.*, 32:368-372.
90. Harpaz, I. 1978. Cultural control of the alfalfa seed chalcid, *Bruchophagus roddi*, in Israel. *FAO Plant Protect. Bull.*, 26:158-162.
91. Tanne, E., Sela, I., Harpaz, I., and Klein, M. 1978. Further studies of a leafroll-associated virus: Transmission from herbaceous plants, purification and characterization. *Monog. I.N.I.A. (Inst. Nac. Invest. Agrar.)*, 18:213-215.

92. Levanony, H., Wahrman, J., and Harpaz, I. 1980. Viruslike particles of crystalline array in male germ cells of the mantid *Holaptilon pusillulum. Abstr. 16th Int. Congr. Entomol., Kyoto, Japan, August 1980*, p. 197.
93. Harpaz, I. 1981. Nonpesticidal control of vector-borne viruses. *In* K. Maramorosch and K.F. Harris (eds.) Pathogens, Vectors, and Plant Diseases: Approaches to Control. Academic Press, pp. 1-21.
94. Harpaz, I. and Venezian, A. 1982. Activation of latent baculovirus in *Spodoptera littoralis* (Boisduval) by overcrowding and by cold treatment. *Programme and Abstracts, 3rd Int. Colloq. Invertebrate Pathol., Brighton, U.K. Sept. 1982*, p. 78.
95 Furth, D.G., Traub, W., and Harpaz, I. 1983. What makes *Blepharida* jump? A structural study of the metafemoral spring of a flea beetle. *J. Exp. Zool.*, 227:43-47.
96. Harpaz, I. 1984. Frederick Simon Bodenheimer (1897-1959): Idealist, Scholar, Scientist. *Annu. Rev. Entomol.*, 29:1-23.
97. Harpaz, I., and Wysoki, M. 1984. Susceptibility of the carob moth, *Ectomyelois caratoniae*, to *Bacillus thuringiensis. Phytoparasitica*, 12:189-191.
98. Ben-Dov, Y., and Harpaz, I. 1985. An annotated list of taxa of Coccoidea (Homoptera) described by F.S. Bodenheimer (1897-1959). *Israel J. Entomol.*, 19:23-36.
99. Snir, R., Dunkelblum, E., Gothilf, S., and Harpaz, I. 1986. Sexual behaviour and pheromone titre in the tomato looper *Plusia chalcites* (Esp.) (Lepidoptera: Noctuidae). *J. Insect Physiol.*, 32:735-739.
100. Cohen, S., Keren, J., Harpaz, I., and Bar-Joseph, R. 1986. Studies on the epidemiology of a whitefly-borne virus, tomato yellow leafcurl, in the Jordan Valley. Abstr. *Phytoparasitica*, 14:158.
101. Harpaz, I. 1986. Plants as intermediary hosts, or "vectors", of pathogens of homopterous insects: A new concept in the evolution of entomopathogenic viruses. *In* R.A. Samson, J.M. Vlak and D. Peters (eds), Fundamental and Applied Aspects of Invertebrate Pathology. Foundation of the 4th International Colloquium of Invertebrate Pathology, Wageningen, The Netherlands, p. 144.
102. Hadar, D., Wysoki, M., Harpaz, I. and Meisner, J. 1986. Trials with phagostimulants for the improvement of the efficacy of *Bacillus thuringiensis* formulations in the control of the giant looper, *Boarmia selenaria* Schiff. (Lepidoptera: Geometridae) in avocado. *Alon Hanotea*, 41:97-104 (in Hebrew with a summary in English).
103. Dunkelblum, E., Snir, R., Gothilf, S., and Harpaz, I. 1987. Identification of sex pheromone components from pheromone gland-volatiles of the tomato looper, *Plusia chalcites* (Esp.). *J. Chem. Ecol.*, 13:991-1003.
104. Dunkelblum, E., Gothilf, S., Moore, I., Snir, R., and Harpaz, I. 1987. Field evaluation and EAG measurements of sex pheromone components of the tomato looper, *Chrysodeixis chalcites* (Esper) (Lepidoptera: Noctuidae). *Israel J. Entomol.* 21:1-9
105. Bensimon, A., Singer, S., Gerassi, E., Harpaz, I., and Sela I. 1987. A lethal disease of locust caused by a lepidopterous baculovirus. *J. Invertebrate Pathol.* (In press).
106. Harpaz, I. 1987. Prospects of improving the effectiveness of insect pathogens for pest control. *In* K. Maramorosch (ed.), Biotechnology Advances in Invertebrate Pathology and Cell Culture. Academic Press, Orlando, Florida, pp. (in press).

B. Popular and Professional Review Articles

1. Harpaz, I. 1947. Prof. F.S. Bodenheimer's Jubilee. *Hatteva Vehaaretz, Tel-Aviv*, 7:315-316 (in Hebrew).
2. Harpaz, I. 1951. On the cultural history of the tobacco plant. *Hassadeh Lanoar, Tel-Aviv*, 9:122-123 (in Hebrew).
3. Harpaz, I. 1955. "The Israel pine *Matsucoccus*" by F.S. Bodenheimer and S. Neumark. Book review. *Hassadeh, Tel-Aviv*, 35:752-753 (in Hebrew).
4. Harpaz, I. 1959. Apicultural research in Israel during the first ten years of statehood. *Amer. Bee J.*, 99:148-149.
5. Harpaz, I. 1959. Comments on the concept of "biological equilibrium" in the insect world. *Teva Vaaretz, Tel-Aviv*, 1:150-153 (in Hebrew).
6. Harpaz, I. 1959. "Pests of the Citrus Tree and their Control" by A. Gruenberg. Book review. *Teva Vaaretz, Tel-Aviv*, 1:417-418 (in Hebrew).

7. Harpaz, I. 1959. Prof. F.S. Bodenheimer, An obituary. *Hassadeh, Tel-Aviv*, 40:123-124 (in Hebrew).
8. Harpaz, I. 1960. Prof. F.S. Bodenheimer, An obituary. *Z. Angew. Entomol.*, 46:228-231.
9. Harpaz, I. 1960. Insect pests. *In* M. Prywes (ed.), Medical and Biological Research in Israel. Magnes Press, Hebrew University, Jerusalem, pp. 207-211.
10. Harpaz, I. 1960. Insects and Arachnids. *In* M. Prywes (ed.), Medical and Biological Research in Israel. Magnes Press, Hebrew University, Jerusalem, pp. 492-497.
11. Harpaz, I. 1961. Report on the Second Conference of the International Organization of Citrus Virologists held in Florida, 7-13 November 1960. *Alon Hanotea, Tel-Aviv*, Vol. 15, No. 9, pp. 49-52 (in Hebrew).
12. Harpaz, I. 1961. "Field Crop Pests in the Near East (Hebrew edition) by E. Rivnay. Book review. *Mada (Jerusalem)*, 6:40-42 (in Hebrew).
13. Harpaz, I. 1963. "Field Crop Pests in the Near East" (English edition) by E. Rivnay. Book review. *Outlook Agr. (London)*, 4:52.
14. Harpaz, I. 1969. Cultural control of plant pests and diseases. *Ariel, Jerusalem*, No. 24, pp. 68-74.
15. Harpaz, I. 1971. Homoptera: Sternorrhyncha. Article in Encyclopaedia Hebraica, Jerusalem, 20:906-910 (in Hebrew).
16. Harpaz, I. 1971. No descuide el control con cultivadores *Agricultura de las Americas*, 20:12, 27.
17. Harpaz, I. 1971. Avidov, Zvi. Article in Encyclopaedia Judaica, Jerusalem, 3:961.
18. Harpaz, I. 1971. Professor Zvi Avidov. *Israel J. Entomol.*, 6:1-3.
19. Harpaz, I. 1973. Professor Ezekiel Rivnay. In Memoriam. *Israel J. Entomol.*, 8:185-188.
20. Harpaz, I. 1975. New challenges for university graduates in agriculture. *Haqlaut Beyisrael* (Agriculture in Israel), Tel-Aviv, Vol. 20, No. 4 p. 34 (in Hebrew).
21. Harpaz, I. 1976. Olive pests. Article in the Encyclopaedia of Agriculture, Tel-Aviv, 3:545-549 (in Hebrew).
22. Harpaz, I. 1976. Biological control of pests by means of bacteria and viruses. Article in The Encyclopaedia of Agriculture, Tel-Aviv, 3:806-810 (in Hebrew).
23. Harpaz, I. 1978. Robert van den Bosch 1922-1978. Obituary. *Israel J. Entomol.*, 12:145-148.
24. Harpaz, I. 1979. Regulatory measures adopted in Israel as regards the screening and field application of pesticides within the context of integrated control. *Int. Pest Control*, 21:28-30.
25. Harpaz, I. 1979. La investigacion y desarollo agricola en Israel. *In* V. Hernando-Fernandez (ed.), La Investigacion Cientifica y el Problema Agrario – Jornadas Internacionales de Organizacion Cientifica, Madrid, pp. 49-57.
26. Harpaz, I. 1980. "Leafhopper Vectors and Plant Disease Agents" (Edited by K. Maramorosch and K.F. Harris). Book Review, *Int. Pest Control*, 22:75-76.
27. Harpaz, I. 1981. Viruses and bacteria (Concluding Remarks, International Symposium on Potatoes in hot Climates) *Potato Res.*, 24:452-453.
28. Harpaz, I. 1982. "Vectors of Plant Pathogens" (Edited by K.F. Harris and K. Maramorosch). Book Review. *J.N.Y. Entomol. Soc.*, 90:58-59.
29. Harpaz, I. 1982. Aphids. *In* Field Activities in the Teaching of Natural History, Part III. Ministry of Education & Culture Curriculum Centre. Jerusalem, pp. 106-110 (in Hebrew).
30. Harpaz, I. 1984. "Cereal Aphid Populations: Biology, Simulation and Prediction" by N. Carter, A.F.G. Dixon and R. Rabbinge. Book review. *Agr. Ecosyst. Environ.*, 11:184-186.
31. Harpaz, I. 1984. Zvi Avidov (1896-1984). In Memoriam. *Phytoparasitica*, 12:217-219.
32. Harpaz, I. 1986. Israel Cohen: Initiator and implementor. An appreciation. *Alon Hanotea*, 40:638 (in Hebrew).

הערות העורך
EDITOR'S NOTE

בפרסום כרך 21 של ISRAEL JOURNAL OF ENTOMOLOGY השלמתי תקופה רצופה של עריכה והוצאה לאור של 10 כרכים של כתב עת זה של החברה האנטומולוגית בישראל -- כעורך ראשי (1981–1978, 1987–1986) וכעורך (1985–1982).

בשנת 1977 נתבקשתי על ידי ועד החברה לקבל את תפקיד העריכה של כתב העת, וזאת לאחר שבאותה שנה חלה הפסקה בפרסומו הסדיר ומספר חברים אף הציעו לבטל את פירסומו. בהתחשב במצב כתב העת בזמן ההוא הסכמתי לנסות ולהתמודד עם האתגר. ואמנם בסיועם הנאמן של חברי המערכת (ובמיוחד ד"ר אמנון פרידברג), של העמיתים אשר עסקו בשיפוט המאמרים, והביסוס הכספי הנדיב של פרופ' חנן ביטינסקי־זלץ ז"ל ושל הקרן ע"ש חנן ביטינסקי־זלץ, חודש הפירסום והוא מתקיים ברציפות משנת 1978 (כרך 12) ועד היום, תוך כדי הכנסת שיפורים בצורתו החיצונית והעמקת מידת השיפוט של המאמרים המתפרסמים בו. אין ספק כי כתב העת של החברה האנטומולוגית קנה לעצמו עמדה חשובה במערך הפרסומים הזואולוגיים של הארץ, והמאמרים המתפרסמים בו מהווים תוספת חשובה למחקר האנטומולוגי של ישראל והמזרח התיכון. כל אלה ישמשו כבסיס מידע רב ערך לכל העוסקים והעתידים לעסוק באנטומולוגיה של איזורנו בשנים הבאות.

לקראת שנת 1988 הצטרפו למערכת ד"ר אלכסנדר טהורי (עורך ראשי), ד"ר יהושע קוגלר וד"ר אליהו סבירסקי (חברי מערכת) ואני מודה להם על התנדבותם ומאחל להם הצלחה בפעילותם. זאת גם שעה מתאימה לפנות לחברים צעירים של החברה להתנדב ולהצטרף למערכת, כדי להבטיח את ההמשכיות בהוצאה לאור של כתב העת.

ולבסוף חובה נעימה היא לי להודות לגברת דבורה דהן, אשר משנת 1979 עוסקת במסירות ובדיקנות בהדפסת התמלילים "האנטומולוגיים" (על כל המיוחד שבהם), ולעובדי דפוס "פרינטיב", על ההפקה הנאה של כתב עת זה.

יאיר בן־דב

ILLUSTRATIONS

Only high quality photographs and drawings will be accepted. Each figure and photograph should be identified on the back, in pencil, with the author's name and figure number. Photographs should be submitted on glossy paper, not smaller than 6x9 cm. Drawings should be prepared as to allow a maximum of 30-50% reduction.

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1. Comprehensive treatments of taxa (genera, families, etc.) will receive higher priority over partial treatments. Partial lists of species or faunistic lists, not accompanied by proper keys or references to such keys will receive lower priority.
2. Authors must comply with the requirements of the International Code of Zoological Nomenclature and with the published Opinions of the International Commission.
3. The following abbreviations should be adopted in the text: *n.gen.* – new genus; *n.sp.* – new species; *n. nom.* – new name, used once to introduce a name replacing a junior homonym; *n. comb.* – new combination of names; *n. syn.* – denotes synonymy established for the first time, *n. stat.* – will be used to indicate a new change in rank of a name; *nomen nudum, nomen dubium* are not abbreviated.
4. In treating the taxonomy of a described taxon, the following form is essential for the beginning of a chapter.

Filippia olea (Costa, 1832) (Fig. 1)

Coccus oleae Costa, 1832:21; Green, 1868:42 (biology)
Lecanium oleae. Smith, 1892:15 (list); Brown, 1899:20 (description)
Filippia oleae. Fernald, 1903:13 (Catalog); Hall, 1943:50 (hosts list)

The full references to the above citations should be given in the REFERENCES section at the end of the article.

5. New taxa must be distinguished from related taxa.
6. In describing new species, the complete data of the type-series, together with the collection(s) in which it is deposited will be recorded in the original description as follows:

MATERIAL EXAMINED. Holotype ♀, Israel, Jerusalem, 14.V.1956, on *Ficus carica*, G. Levi (BMNH). Paratypes, 2♀♀, same data as holotype, (USNM); 8♀♀' Tel Aviv, 3.V.1962, *Acacia* sp., G. Brown (ZTV).

7. Records of described species will be listed at the end of each relevant chapter in the following form:

MATERIAL EXAMINED: Sinai, Dahab, 13.V.1958, ex. *Phoenix* sp., D. Cohen (1♂, 1♀; BMNH); Israel, Haifa, 20.II.1967, *Pistacia vera*, M. Levi (1♀; ZTV).

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Spelling and terminology should be consistent throughout. Scientific names should be underlined and followed by the name of the first describer, written out in full. Names of localities in Israel will be given as they are transliterated in the latest issue of "List of settlements, localities and antiquity sites, Survey of Israel, Ministry of Labour". Regions in Israel and nearby areas should follow the "fauna Palaestina" map (as in Theodor, O. 1975. Fauna Palaestina, Insecta I: Diptera Pupipara. The Israel Academy of Sciences and Humanities, Jerusalem).

TABLES

Tables should be kept to a minimum and must be typed on separate sheets; their approximate position being indicated in the manuscript. The same data should not be given both in tables and graphs.

REFERENCES

1. In the text, reference to the literature should conform to the "name-and-date" system, *e.g.* – Williams (1929); (Bodenheimer, 1938); Jones and Smith (1950). Unpublished references are to be cited as author followed by either (personal communication), (unpublished) or (in press). Only the latter category will appear in the list of references, together with the title of the periodical to which it was submitted for publication.
2. When reference is made to taxonomic descriptions, or to quoted passages – the relevant page-number(s) should follow the year, *e.g.* Brown (1939:25).
3. Where three or more authors are concerned, reference is made only to the first, followed by "*et al.*" and the date: Thomson *et al.* (1945).
4. The list of references will be given at the end of the article, according to the following forms, *with the titles of all periodicals unabbreviated.*

Bergman, E.D. 1976. The future of insecticides – a problem of human environment. *Israel Journal of Entomology* 11:5-14.

Taylor, L.R. and J.M.P. Palmer. 1970. Aerial sampling. *In:* Aphid Technology. Edit. H.F. van Emden. Academic Press, London.

Wigglesworth, V.B. 1972. The Principles of Insect Physiology. 7th edition. Chapman and Hall, London.