Remembering Hagai (1944–2012)

Ron Shaar¹

Published online: 13 November 2015

© Springer Science+Business Media New York 2015

Hagai Ron was a worldwide pioneer in paleomagnetism and the founder of paleo- and archaeo-magnetic research in Israel. He was born in 1944 on Kibbutz Beit Haarava, on the northern shores of the Dead Sea. After Beit Haarava was evacuated in 1948, the Kibbutz's members, Hagai's parents among them, founded Kibbutz Kabri, a place that was to become Hagai's beloved home for 64 years until his very last days. He is survived by three daughters—Rotem, Shirley, and Shulamit (Shushu)—and five grandchildren (still counting).

While working on the Kibbutz and leading it as secretary, Hagai completed BSc and MSc degrees in geology, both at The Hebrew University of Jerusalem. During his MSc

---

This special issue of the *African Archaeological Review* on Wonderwerk Cave is dedicated to our colleague and friend Prof. Hagai Ron who passed away on 10 September 2012 after a short and courageous battle with cancer.

✉ Ron Shaar
ron.shaar@mail.huji.ac.il

¹ The Institute of Earth Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel

thesis, he became acquainted with paleomagnetism, a brand new geophysical method back then. Encouraged by his PhD advisor, the late Prof. Rafi Freund, who recognized Hagai's special skills, Hagai took on a particularly challenging task for his doctoral dissertation. In his doctoral project, he developed paleomagnetic methods to reconstruct ancient tectonic rotations in the Galilee. His PhD (Ron *et al.* 1984) on block rotations marked a remarkable worldwide breakthrough in the interaction between field geology and geophysics and still serves as an important milestone in paleomagnetic research, even by today's standards. After a postdoctorate at Stanford, Hagai returned to Israel and established a paleomagnetic laboratory at the Geophysical Institute of Israel, with one of the first cryogenic magnetometers in the world, the cutting-edge technology of the time. He moved with his laboratory to The Hebrew University of Jerusalem in 2001, where he served as a professor until his retirement.

Hagai was a very creative scientist who kept coming up with new and innovative ideas of how to incorporate paleomagnetism and rock magnetism in interrelated fields of research. He studied ancient and recent earthquakes by combining archaeological and geological observations (Nur *et al.* 1993; Marco *et al.* 1996; Nur and Ron 1996). He explored the past behaviour of the geomagnetic field from the Dead Sea basin lacustrine deposits (Marco *et al.* 1998). And he dived into the microscopic magnetic world of the tiniest particles in an effort to show how lake sediments could reveal the secrets of the ancient geomagnetic field (Ron *et al.* 2006, 2007). He used paleomagnetism to reconstruct past tectonic activity in a wide range of geological settings including Cyprus (Granot *et al.* 2006, 2011; Ebert *et al.* 2010), North America (Ron *et al.* 1986; Li *et al.* 1990; Ron *et al.* 1993; Eyal and Ron 1995; Ron and Nur 1996) and of course Israel (Ron *et al.* 1984, 1985, Ron *et al.* 1990; Ron 1987; Heimann and Ron 1987; Ron and Kolodny 1992; Heimann and Ron 1993; Weinberger *et al.* 1995, 1997; Hurwitz *et al.* 1999), among others. In his work, Hagai not only insisted on carrying out paleomagnetic analysis, as many paleomagnetists would do, but also did it the "hard way" and incorporated thorough rock magnetic investigations. He explored in his career almost all types of rocks, including extrusive and intrusive volcanic rocks, marine and lake sediments, loess, carbonates and dolomites—and this is just a short and partial list. Hagai travelled all over the globe with his portable rock drill collecting thousands of rock samples, driven by an enthusiastic motivation to study, explore and reveal.

Hagai made a number of essential and influential contributions to archaeomagnetism. He used magnetostratigraphy to determine the age of several key prehistoric sites in Israel, including Ubeidiya, Erk el-Ahmar (Braun *et al.* 1991; Ron and Levi 2001; Davis *et al.* 2011), Evron (Ron *et al.* 2003), Ruhama and Revadim (Gvirtzman *et al.* 1999), and was a founding team member of the Wonderwerk Cave project, South Africa. It was Hagai's initial paleomagnetic findings from Excavation 1 at this cave (Ron *et al.* 2005) that gave the first inkling of the great antiquity of the lowermost layers in this site. Since these surprising results extended the cave sequence back *ca.* one million years earlier than previously thought, Hagai, being a meticulous scientist, insisted on re-sampling the entire section to corroborate his initial findings, rather than rushing to publish these results (Chazan *et al.* 2008).

Some of Hagai's last research was dedicated to a large-scale archaeomagnetic campaign aiming at reconstructing variations in the intensity of the geomagnetic field over the past several millennia from pottery and slag materials (Ben-Yosef *et al.* 2008,

2009; Shaar *et al.* 2010, 2011). This effort, currently continued by his students, is expected to deliver a brand new dating technique for the archaeological community.

Hagai was a wonderful teacher, colleague, friend and notably one of the most inspiring scientists I worked with. He was kind, respectful, open-minded and a true gentleman. He was a dedicated and caring mentor to his students, and I was lucky to be one of them. His creative and profound thinking, enthusiasm and humour will remain unforgettable. I am grateful for the privilege of having known and worked with him. He will be sorely missed.

References

- Ben-Yosef, E., Ron, H., Tauxe, L., Agnon, A., Genevey, A., Levy, T. E., Avner, U., & Najjar, M. (2008). Application of copper slag in geomagnetic archaeointensity research. *Journal of Geophysical Research-Solid Earth*, 113 (B8). DOI: 10.1029/2007JB005235
- Ben-Yosef, E., Tauxe, L., Levy, T. E., Shaar, R., Ron, H., & Najjar, M. (2009). Geomagnetic intensity spike recorded in high resolution slag deposit in Southern Jordan. *Earth and Planetary Science Letters*, 287, 529–539.
- Braun, D., Ron, H., & Marco, S. (1991). Magnetostratigraphy of the hominid tool-bearing Erk el Ahmar Formation in the northern Dead Sea Rift. *Israel Journal of Earth Sciences*, 40, 191–197.
- Chazan, M., Ron, H., Matmon, A., Porat, N., Goldberg, P., Yates, R., Avery, M., Sumner, A., & Horwitz, L. K. (2008). Radiometric dating of the Earlier Stone Age sequence in Excavation I at Wonderwerk Cave, South Africa: Preliminary results. *Journal of Human Evolution*, 55(1), 1–11.
- Davis, M., Matmon, A., Fink, D., Ron, H., & Niedermann, S. (2011). Dating Pliocene lacustrine sediments in the central Jordan Valley, Israel—Implications for cosmogenic burial dating. *Earth and Planetary Science Letters*, 305(3–4), 317–327.
- Ebert, Y., Kessel, R., Shaar, R., Agnon, A., & Ron, H. (2010). Petrology and rock magnetism of the gabbro of Troodos ophiolite. *Physics of the Earth and Planetary Interiors*, 183(3–4), 413–420.
- Eyal, Y., & Ron, H. (1995). Late Cenozoic crustal deformation of the North-Central basin and Range Province, Western US. *Tectonophysics*, 246(4), 211–224.
- Granot, R., Abelson, M., Ron, H., & Agnon, A. (2006). The oceanic crust in 3D: Paleomagnetic reconstruction in the Troodos ophiolite gabbro. *Earth and Planetary Science Letters*, 251(3–4), 280–292.
- Granot, R., Abelson, M., Ron, H., Lusk, M. W., & Agnon, A. (2011). Direct evidence for dynamic magma supply fossilized in the lower oceanic crust of the Troodos ophiolite. *Geophysical Research Letters*, 38, L16311. doi:10.1029/2011GL048220.
- Gvirtzman, G., Wieder, M., Marder, O., Khalaily, H., Rabinovich, R., & Ron, H. (1999). Geological and pedological aspects of an Early-Paleolithic site: Revadim, central coastal plain, Israel. *Geoarchaeology*, 14, 101–126.
- Heimann, A., & Ron, H. (1987). Young faults in the Hula Pull-Apart basin, central Dead Sea Transform. *Tectonophysics*, 141(1–3), 117–124.
- Heimann, A., & Ron, H. (1993). Geometric changes of plate boundaries along part of the Northern Dead Sea transform—Geochronological and paleomagnetic evidence. *Tectonics*, 12(2), 477–491.
- Hurwitz, S., Matmon, A., Ron, H., & Heiman, A. (1999). Deformation along the margins of the Dead Sea Transform: The Yehudiyya Block, Golan Heights. *Israel Journal of Earth Sciences*, 48, 257–264.
- Li, Y., Geissman, J. W., Nur, A., Ron, H., & Huang, Q. (1990). Paleomagnetic evidence for counterclockwise block rotation in the north Nevada rift region. *Geology*, 18(1), 79–82.
- Marco, S., Stein, M., Agnon, A., & Ron, H. (1996). Long-term earthquake clustering: A 50,000-year paleoseismic record in the Dead Sea graben. *Journal of Geophysical Research-Solid Earth*, 101(B3), 6179–6191.
- Marco, S., Ron, H., McWilliams, M. O., & Stein, M. (1998). High-resolution record of geomagnetic secular variation from Late Pleistocene Lake Lisan sediments (paleo Dead Sea). *Earth and Planetary Science Letters*, 161(1–4), 145–160.
- Nur, A., & Ron, H. (1996). “And the walls came tumbling down”: Earthquake history in the Holy Land. *Archaeoseismology: British School at Athens, Fitch Laboratory Occasional Paper*, 7, 75–85

- Nur, A., Ron, H., & Beroza, G. C. (1993). The nature of the Landers-Mojave earthquake line. *Science*, 261(5118), 201–203.
- Ron, H. (1987). Deformation along the Yammuneh, the restraining bend of the Dead-Sea Transform—Paleomagnetic data and kinematic implications. *Tectonics*, 6(5), 653–666.
- Ron, H., & Eyal, Y. (1985). Intraplate deformation by block rotation and nesostructures along the Dead Sea transform, northern Israel. *Tectonics*, 4(1), 85–105.
- Ron, H., & Kolodny, Y. (1992). Paleomagnetic and rock magnetic study of combustion metamorphic rocks in Israel. *Journal of Geophysical Research: Solid Earth*, 97(B5), 6927–6939.
- Ron, H., & Nur, A. (1996). Vertical axis rotations in the Mojave: Evidence from the Independence Dike Swarm. *Geology*, 24(11), 973–976.
- Ron, H., & Levi, S. (2001). When did hominids first leave Africa?: New high-resolution magnetostratigraphy from the Erk-el-Ahmar Formation, Israel. *Geology*, 29(10), 887–890.
- Ron, H., Freund, R., Garfunkel, Z., & Nur, A. (1984). Block rotation by strike-slip faulting—Structural and paleomagnetic evidence. *Journal of Geophysical Research*, 89, 6256–6270.
- Ron, H., Aydin, A., & Nur, A. (1986). Strike-slip faulting and block rotation in the Lake Mead Fault System. *Geology*, 14(12), 1020–1023.
- Ron, H., Nur, A., & Eyal, Y. (1990). Multiple strike-slip-fault sets—a case-study from the Dead-Sea Transform. *Tectonics*, 9(6), 1421–1431.
- Ron, H., Nur, A., & Aydin, A. (1993). Rotation of stress and blocks in the Lake Mead, Nevada, Fault System. *Geophysical Research Letters*, 20(16), 1703–1706.
- Ron, H., Porat, N., Ronen, A., Tchernov, E., & Horwitz, L. K. (2003). Magnetostratigraphy of the Evron Member—Implications for the age of the Middle Acheulian site of Evron Quarry. *Journal of Human Evolution*, 44(5), 633–639.
- Ron, H., Beaumont, P., Chazan, M., Horwitz, L.K., Porat, N., & Yates, R. (2005). Evidence for early Acheulian cave occupation revealed by the magnetostratigraphy of Wonderwerk Cave, Northern Cape. *SASQUA XVI Biennial Conference*, Bloemfontein, Abstracts, 49–50.
- Ron, H., Nowaczyk, N. R., Frank, U., Marco, S., & McWilliams, M. O. (2006). Magnetic properties of Lake Lisan and Holocene Dead Sea sediments and the fidelity of chemical and detrital remanent magnetization. *Geological Society of America Special Papers*, 401, 171–182.
- Ron, H., Nowaczyk, N. R., Frank, U., Schwab, M. J., Naumann, R., Striewski, B., & Agnon, A. (2007). Greigite detected as dominating remanence carrier in late Pleistocene sediments, Lisan Formation, from Lake Kinneret (Sea of Galilee), Israel. *Geophysical Journal International*, 170(1), 117–131.
- Shaar, R., Ron, H., Tauxe, L., Kessel, R., Agnon, A., Ben-Yosef, E., & Feinberg, J. M. (2010). Testing the accuracy of absolute intensity estimates of the ancient geomagnetic field using copper slag material. *Earth and Planetary Science Letters*, 290(1–2), 201–213.
- Shaar, R., Ben-Yosef, E., Ron, H., Tauxe, L., Agnon, A., & Kessel, R. (2011). Geomagnetic field intensity: How high can it get? How fast can it change? Constraints from Iron Age copper slag. *Earth and Planetary Science Letters*, 301(1–2), 297–306.
- Weinberger, R., Agnon, A., Ron, H., & Garfunkel, Z. (1995). Rotation about an inclined axis—3-dimensional matrices for reconstructing paleomagnetic and structural data. *Journal of Structural Geology*, 17(6), 777–782.
- Weinberger, R., Agnon, A., & Ron, H. (1997). Paleomagnetic reconstruction of a diapir emplacement: A case study from Sedom diapir, the Dead Sea Rift. *Journal of Geophysical Research-Solid Earth*, 102(B3), 5173–5192.