

## NORTHWEST AFRICA 753

### R3.9, rumurutiite

Found January 2000  
coordinates not recorded

Multiple fragments weighing together 12 kg were purchased in Rissani, Morocco. This meteorite was probably found in the Kem Kem region of the Sahara. Classification was performed at the Institut für Planetologie in Münster, Germany. Northwest Africa 753 is an unbrecciated meteorite that is relatively fresh (W2) compared to most other R chondrite finds, and is only very weakly shocked (S2). Sulfides within the meteorite are well preserved.

In addition to NWA 753 (R3.9), several other unbrecciated R chondrites have been recovered so far: SAH 99527 is an R5; HaH 119, Ouzina, NWA 053, NWA 800, and SAH 98248 are all R4; NWA 755 is an R3.7; and Carlisle Lakes and NWA 978 are subtype 3.8. Consistent with an unbrecciated texture and an absence of solar gases, NWA 753 was not part of a regolith. The R chondrites in which cosmic-ray exposure ages have been determined so far all fall into two CRE age groups, 7.7 ( $\pm 1.0$ ) m.y. and 40 ( $\pm 4.0$ ) m.y. The CRE age for NWA 753 of  $\sim 8$  m.y., is consistent with its inclusion into the first group. Evidence gathered thus far indicates that NWA 753 is not paired with any of the other R chondrites recently found in this region.

This is a unique group of chondrites having a higher volume of olivine (FeO-rich), a lower volume of pyroxene, and essentially no FeNi-metal as compared to all other chondrite groups. While R chondrites share certain similarities with ordinary chondrites including refractory element depletions and siderophile element abundances, they differ in volatile element abundances and petrologic trends. The triple increase in Zn relative to ordinary chondrites is consistent with formation in a more oxidizing environment, between that of ordinary chondrites and carbonaceous chondrites. The difference in O-isotopic abundances between the R chondrites and the ordinary chondrites is greater than it is among the H, L, and LL ordinary chondrite groups, further resolving the R group

from the ordinary chondrite groups. Similar to carbonaceous chondrites, R chondrites have a high olivine content within a high proportion of matrix, reflecting their highly oxidized nature. R chondrites have the highest 17O value of any other solar system material. Type-3 R chondrites contain noble metals such as platinum, osmium, and germanium that originated as nebular condensates. In higher metamorphic types, the volatile germanium phases are decomposed, while other noble metal phases are transformed into mostly arsenides and tellurides.

This unique chondrite group was originally named for the Carlisle Lakes, Australia (49.5 g) specimen but was renamed for the only fall of the group from Rumuruti, Kenya (67 g). There have recently been several other R chondrite finds in the hot and cold deserts of Africa, Australia, and Antarctica. The photos above show two sides of a 0.54 g specimen of NWA 753, one of them completely covered with remnant fusion crust.