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A NEW TRILOBITE BIOSTRATIGRAPHY FOR THE LOWER ORDOVICIAN OF WESTERN LAURENTIA AND PROSPECTS FOR INTERNATIONAL CORRELATION USING PELAGIC TRILOBITES

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Field based revision of classic sections in the type Ibexian area of western Utah (Hintze, 1951, 1953) and the Bear River Range of southeastern Idaho (Ross, 1949, 1951), along with sections in east-central Nevada, has revealed an order of magnitude more faunal information than was previously known. There are nearly continuous sequences of rich, closely spaced, and beautifully preserved secondarily silicified assemblages spanning the entire Lower Ordovician. The existing trilobite biostratigraphic scheme (Ross et al., 1997) was based on the original fieldwork carried out in the late 1940s, with only minor additions or modifications over the next half century. An extensive field sampling program permits the development of a much more detailed scheme. Ross et al. (1997), for example, recognized a total of five trilobite zones for the Tulean and Blackhillsian stages (the upper two stages of the Ibexian Series). Adrain et al. (2009), in contrast, recognized at least 15 distinct zones in this interval, and this number is now increased to 17. Revision in progress of the Stairsian Stage replaces the four zones of Ross et al. (1997) with 13 new or restricted zones. Revision of the upper part of the Skullrockian Stage replaces the single *Bellefontia-Xenostegium* Zone of Ross et al. (1997) with seven distinct zones.

The new biostratigraphic scheme is not based on more finely parsing stratigraphic distribution, nor is it a function of differing species concepts. It derives largely from extensive new discoveries in large swathes of the sections previously given only cursory treatment via undocumented faunal lists (or not sampled at all). In addition, existing horizon diversities reported by Hintze (1953) have in many cases been more than doubled, almost certainly as a result of greatly increased sample size.

Among the rich new faunas encountered are pelagic (mesonektic) telephinid trilobites belonging to the genera *Goniophrys* Ross, 1951, *Carolinites* Kobayashi, 1940, and *Opipeuterella* Fortey, 2005. These taxa include some of the few trilobite species with convincingly established intercontinental distributions during the Ordovician (e.g., Fortey, 1975; McCormick and Fortey, 1999). In addition to the very widely distributed *Carolinites genacinaca* Ross, 1951, which has its type horizon in the study area, the faunas include *Opipeuterella inconniva* (Fortey, 1974), described from Spitsbergen, and *O. insignis* (Henderson, 1983), described from Australia. All of these species are key to an emerging global framework for upper Floian trilobite biostratigraphy based on pelagics. This framework may be extended to the lower Floian via the discovery of a sequence of new, stratigraphically early species of *Carolinites* with which subsequent discoveries elsewhere may be matched, and particularly by a sequence of early, well preserved species of

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Opipeuterella. These can be compared directly with a similar sequence described by Laurie and Shergold (1996) from the Emanuel Formation of Western Australia.

This latter comparison suggests, via tie points with the Australian graptolite scheme, that the Tremadocian/Floian boundary occurs much lower down in the western Laurentian succession than has previously been assumed. It may approximately correspond with the Stairsian-Tulean boundary and cannot be very far above it. The distinction between the Laurentian Tulean and Blackhillsian stages is trilobite-based, but there are few compelling faunal reasons to make a stadial distinction and the base of the Blackhillsian is unlikely to be easily recognized outside the western Laurentian region. The Tulean and Blackhillsian stages together approximately represent the Floian.

REFERENCES

Adrain, J.M., McAdams, N.E.B. and Westrop, S.R. 2009. Trilobite biostratigraphy and revised bases of the Tulean and Blackhillsian Stages of the Ibexian Series, Lower Ordovician, western United States. *Memoirs of the Association of Australasian Palaeontologists*, 37, 541-610.

Fortey, R.A. 1974. A new pelagic trilobite from the Ordovician of Spitsbergen, Ireland and Utah. *Palaeontology*, 17, 111-124.

Fortey, R.A. 1975. The Ordovician trilobites of Spitsbergen. II. Asaphide, Nileidae, Raphiophoridae and Telephinidae of the Valhallfonna Formation. *Norsk Polarinstitutt Skrifter*, 162, 1-207.

Fortey, R.A. 2005. *Opipeuterella*, a replacement name for the trilobite *Opipeuter* Fortey, 1974, preoccupied. *Journal of Paleontology*, 79, 1036.

Henderson, R.A. 1983. Early Ordovician faunas from the Mount Windsor Subprovince, northeastern Queensland. *Memoirs of the Association of Australasian Palaeontologists*, 1, 145-175.

Hintze, L.F. 1951. Lower Ordovician detailed stratigraphic sections for western Utah. *Utah Geological and Mineralogical Survey Bulletin*, 39, 1-99.

Hintze, L.F. 1953. Lower Ordovician trilobites from western Utah and eastern Nevada. *Utah Geological and Mineralogical Survey Bulletin*, 48, 1-249. (For 1952).

Kobayashi, T. 1940. Lower Ordovician fossils from Caroline Creek, near Latrobe, Mersey River district, Tasmania. *Papers and Proceedings of the Royal Society of Tasmania*, 1939, 67-76. (For 1939).

Laurie, J.R. and Shergold, J.H. 1996. Early Ordovician trilobite taxonomy and biostratigraphy of the Emanuel Formation, Canning Basin, Western Australia. Part 1. *Palaeontographica Abteilung A*, 240, 65-103.

McCormick, T. and Fortey, R.A. 1999. The most widely distributed trilobite species: Ordovician *Carolinites genacinana*. *Journal of Paleontology*, 73, 202-218.

Ross, R.J., Jr. 1949. Stratigraphy and trilobite faunal zones of the Garden City Formation, northeastern Utah. *American Journal of Science*, 247, 472-491.

Ross, R.J., Jr. 1951. Stratigraphy of the Garden City Formation in northeastern Utah, and its trilobite faunas. *Peabody Museum of Natural History, Yale University, Bulletin*, 6, 1-161.

Ross, R.J., Jr, Hintze, L.F., Ethington, R.L., Miller, J.F., Taylor, M.E. and Repetski, J.E. 1997. The Ibexian, lowermost series in the North American Ordovician. *United States Geological Survey Professional Paper*, 1579, 1-50.

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