A coelacanth scale from the Upper Triassic Pardonet Formation, British Columbia, Canada

Authors: Yabumoto, Yoshitaka, and Neuman, Andrew

Source: Paleontological Research, 8(4) : 337-340

Published By: The Palaeontological Society of Japan

URL: https://doi.org/10.2517/prpsj.8.337

Paleontological Research, vol. 8, no. 4, pp. 337–340, December 31, 2004

A coelacanth scale from the Upper Triassic Pardonet Formation, British Columbia, Canada

YOSHITAKA YABUMOTO[1] AND ANDREW NEUMAN[2]

[1]*Kitakyushu Museum of Natural History and Human History, 2-4-1, Higashida Yahatahigashiku Kitakyushu 805-0071, Japan (e-mail: yabumoto@kmnh.jp)*

[2]*Royal Tyrrell Museum of Palaeontology, Drumheller, Alberta Canada T0J 0Y0 (e-mail: Andrew.Neuman@gov.ab.ca)*

Received June 2, 2004; Revised manuscript accepted September 6, 2004

Key words: British Columbia, Canada, Coelacanth, *Garnbergia*, ichthyosaur, scale, Pardonet Formation, Upper Triassic

Introduction

A large ichthyosaur specimen was first reported from the Sikanni Chief River (Pink Mountain), British Columbia, Canada by Keary Walde in 1992. It was excavated by the Canada-Japan Project for Triassic Marine Environments in 1998 to 1999 (Nicholls and Manabe, in prep). During the excavation, an isolated scale was found from the same site and stratigraphic level of the ichthyosaur. This is the first vertebrate specimen from the site excepting ichthyosaurs. The characters of the scale indicate it belongs to a coelacanth. This is the first record of a coelacanth from the Upper Triassic in Canada.

Systematic description

Order Coelacanthiformes Huxley, 1861
Suborder Latimeroidei Schultze, 1993
Family Mawsoniidae Schultze, 1993
Genus ***Garnbergia*** Martin and Wenz, 1984

Garnbergia sp. cf. ***G. ommata*** Martin and Wenz, 1984

Figures 1 and 2

Material.—Royal Tyrrell Museum of Paleontology–TMP 2000.24.15, an isolated scale.

Locality.—Sikanni Chief River (Pink Mountain) British Columbia, Canada, the same locality as a large ichthyosaur, TMP 94.378.2 (Nicholls and Manabe, in prep).

Formation and Age.—Pardonet Formation, *Epigondoella postera* conodont zone, Late Triassic (early Middle Norian) (Michael J. Orchard personal communication, 2004).

Description.—The scale is oval, but not elongated. The maximum length is 19.3 mm. The depth is 14.5 mm. The length of the exposed field is 10.8 mm, which is longer than the overlapped field. On the exposed field, there are crowded long and short grooves, that are negative impressions of ridges (Figures 1 and 2). The number of grooves in a vertical line is 55 to 56. The maximum depth of the portion covered by the grooves is 12.1 mm. The anterior portion of the exposed field is triangular without grooves, but minute tubercles occur on this surface. Two layers enclosing fibers in different orientations are observed on the overlapped field. There are gaps between fibers of the exposed field, that probably occurred during the process of fossilization.

Concluding remarks

This scale appears to belong to a member of the order Coelacanthiformes, because it consists of a basal layer that is laid down as a series of layers with successive layers enclosing fibers in different orientations. The unique characteristic of this scale is crowded long and short ridges on the exposed portion (Figures 1 and 2).

A coelacanth fossil, *Coelacanthus banffensis* was described from the Early Triassic near Banff, Alberta, Canada by Lambe (1916), then Gardiner (1966) considered that it belongs to the genus *Whiteia*. The age of the present fossil from Sikanni Chief River is Late Triassic vs. the Early Triassic age of *W. banffensis*. Five species of the genus *Whiteia*, *W. woodwardi* Moy-

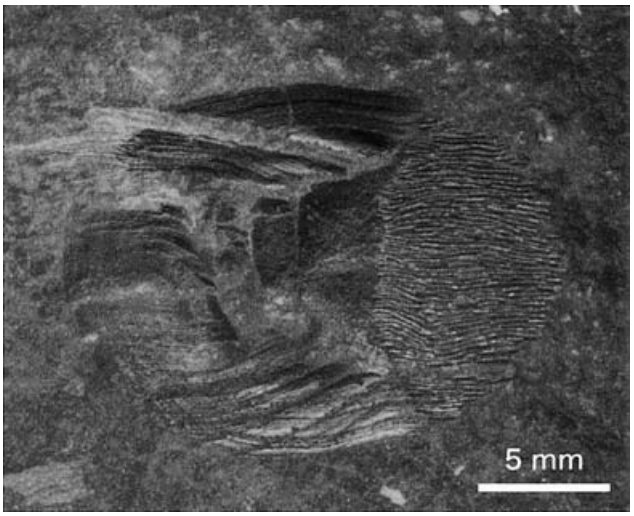

Figure 1. An isolated coelacanth scale of *Garnbergia* sp. cf. *G. ommata* Martin and Wenz, 1984 from Sikanni Chief River (Pink Mountain) British Columbia, Canada, the same locality as ichthyosaur TMP 94.378.2, Pardonet Formation, *Epigondoella postera* conodont zone, Late Triassic (lower Middle Norian).

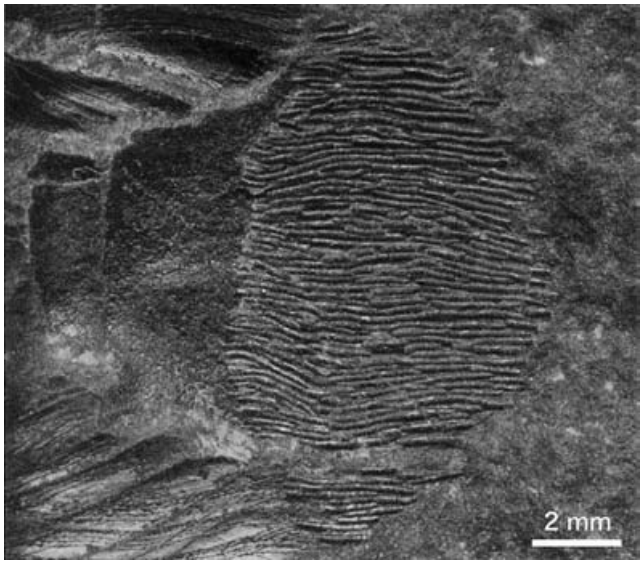

Figure 2. Ridges on the exposed portion of the coelacanth scale from Sikanni Chief River.

Thomas, 1935 (Lower Triassic, Scythian, Middle Sakemena Group, northern Madagascar), *W. tuberculata* Moy-Thomas, 1935 (Lower Triassic, Scythian, Middle Sakemena Group, northern Madagascar), *W. neilseni* Forey, 1998 (Lower Triassic, Scythian, Wordie Creek Formation, Cape Stosch, East Greenland), *W. africanus* (Broom, 1905) (Lower Triassic of Republic of South Africa), *W. banffensis* (Lambe, 1916) (Lower Triassic, Scythian, Spray River Formation, Banff, Alberta) have been described. Among them the present species somewhat resembles *W. neilseni* in having similar ridges on the exposed portion of the scale, but the ridges of the present species are finer and more numerous than those of *W. neilseni*. Other species of *Whiteia* have ridges that are separated from each other, but this species has ones that contact each other. All species of the genus *Whiteia* have been found only in Early Triassic deposits.

The scales of *Chinlea sorenseni* Schaeffer, 1967 from the Late Triassic differ from this specimen in having different ornamentation on the exposed portion of the scales. In *C. sorenseni*, the ridges on the exposed portions are fewer and some ridges are separate from each other. There are some ridges not reaching to the posterior margin in *C. sorenseni*. Late Triassic *Diplurus newarki* (Bryant, 1934) has a smaller number of ridges and a central long ridge with short lateral tubercles (about half the length of the long one). The ridges are long, not divided, and separate from each other. In *Diplurus* the ornament varies between species but also between scales from different parts of the body (Forey, 1998). In the present study, type specimens of *D. newarki* and some species of *Whiteia* have been examined. In *Diplurus* and *Whiteia* the number of ridges probably increases with growth, because small specimens have fewer ridges and larger specimens have more.

The present scale probably belongs to a species of the genus *Garnbergia* because its ornamentation on the exposed field is similar to that of *G. ommata* Martin and Wenz, 1984 from the Middle Triassic (Ladinian) of West Germany. In the counterpart of the holotype of *G. ommata*, there are numerous long undulate grooves that are negative impressions of ridges on the exposed area of the scale (Figure 3). Our specimen differs from *G. ommata* in having a larger number of grooves (55 or 56 in this species, up to 40 in *G. ommata*).

It is also possible that our specimen belongs to a species of *Wimania* Stensiö, 1921 from the Lower Triassic (Scythian), Sassendalen Group, Sticky Keep Formation, West Spitzbergen. *W.* (?) *multistriata* especially resembles our specimen in the large size and the ornamentation of the exposed area, but the shape of the scales are different. Scales of *W.* (?) *multistriata* are long, but the present scale is more rounded.

In the present study, the present scale appears to belong to a species of the genus *Garnbergia,* because the ornamentation of the exposed field shows the same pattern and the age is closer to *Garnbergia*

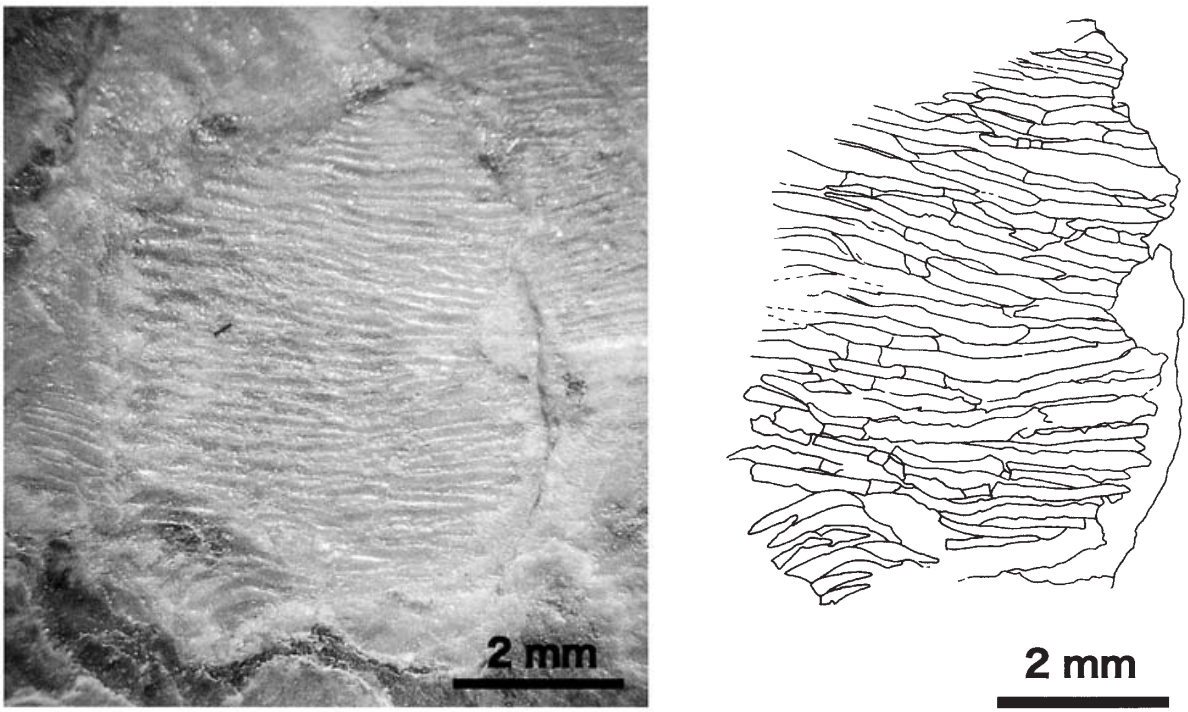

Figure 3. An exposed portion of a scale of the holotype, SMNS 51035 of *Garnbergia ommata* Martin and Wenz, 1984 from the Middle Triassic (Ladinian) West Germany.

(Middle Triassic) than *Wimania* (Early Triassic). The smaller number of ridges in *G. ommata* is probably attributable to its small size (estimated TL about 50 cm).

This is the first record of a coelacanthiform from the Upper Triassic of Canada and evidence indicates that *Garnbergia* existed at least from the Middle to Late Triassic and probably had a wider distribution in the Triassic.

Acknowledgments

We express our sincere gratitude to Teruya Uyeno of the National Science Museum, Tokyo and Peter Forey of the Natural History Museum, London, for their critical reading of the manuscript and their valuable advice. We thank Betsy Nicholls of the Royal Tyrrell Museum of Palaeontology and Manabe Makoto of the National Science Museum, Tokyo, for providing the specimen for this study and the information on the locality. We thank Michael J. Orchard of the Geological Survey of Canada for his information on the age of the locality. We thank Ronald Böttcher of Staatliches Museum für Naturkunde, John G. Maisey of the American Museum of Natural History, and Peter L. Forey for allowing us to examine the specimens in their care, and Ivy Rutsky for her help in examination of the specimens in the American Museum of Natural History. This study was supported by the Japanese Society for the Promotion of Science Grant-in-aid for Scientific Research A2 12375001 for Makoto Manabe.

References

Broom, R., 1905: On a species of *Coelacanthus* from the Upper Beaufort Beds of Aliwal North. *Records of the Albany Museum*, *Grahamstown*, vol. 1, p. 338–339.

Bryant, W. L., 1934: New fishes from the Triassic of Pennsylvania. *Proceedings of the American Philosophical Society,* vol. 73, p. 319–326.

Forey, P. L., 1998: *History of the Coelacanth Fishes*, xiii+419p. Chapman & Hall, London.

Gardiner, B. G., 1966: Catalogue of Canadian fossil fishes. *Royal Ontario Museum, University of Toronto, Life Sciences Contributions*, no. 68, p. 1–154.

Huxley, T. H., 1861: Preliminary essay upon the systematic arrangement of the fishes of the Devonian epoch. *Memoirs of the Geological Survey of the United Kingdom, Figures and Description of British Organic Remains*, no. 10, p. 1–40.

Lambe, L. M., 1916: Ganoid fishes from near Banff, Alberta. *Transactions of Royal Society of Canada*, ser. 3, sect. 4, vol. 10, p. 35–44.

Martin, M. and Wenz, S., 1984: Decouverte d'un nouveau Coelacanthide, *Garnbergia ommata* n.g., n.sp., dans le Muschelkalk superieur du Baden-Wurttemberg. *Stuttgarter Beiträge zur Naturkunde, B (Geologie und Paläontologie)*, no. 105, p. 1–17.

Moy-Thomas, J. A., 1935: The coelacanth fishes from Madagascar. *Geological Magazine*, vol. 72, p. 213–227.

Nicholls, B. and Manabe, M., in prep.: Giant ichthyosaurs of the Triassic – A new species of *Shonisaurus* from the Pardonet Formation (Norian: Late Triassic) of British Columbia.

Schaeffer, B., 1967: Late Triassic fishes from the western United States. *Bulletin of the American Museum of Natural History,* vol. 135, p. 285–342.

Schultze, H.-P., 1993: Osteichthyes: Sarcopterygii. *In*, M. J. Benton, *ed., The Fossil Record 2*, p. 657–663. Chapman & Hall, London.

Stensiö, E. A., 1921: *Triassic Fishes from Spitzbergen, Part 1*, xxxviii+307p. Vienna, Adolf Hozhausen.