

Stratigraphy, sandstone composition, and detrital zircon U-Pb ages of Permian strata in the Hongo-Moribu area of the Hida-gaien belt, central Japan

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Paleozoic and Mesozoic shallow marine strata are widely distributed in the Hongo-Moribu area of the Hida-gaien belt, Takayama City, Gifu Prefecture. A complicated geologic structure has been recognized for these rocks that are subdivided into the Devonian Rosse Formation, the Carboniferous Arakigawa Formation, the Permian Moribu Formation, and the Triassic Tandodani Formation (e.g., Isomi and Nozawa, 1957; Tsukada et al., 1997; Tazawa et al., 2000). Among them, the Moribu Formation has been studied mainly in the type locality (Moribudanigawa River) in terms of the stratigraphy and sandstone composition (e.g., Yoshida and Tazawa, 2000). Middle Permian fusulinids and brachiopods were reported from several localities along the Moribudanigawa River (e.g., Horikoshi et al., 1987; Tazawa, 2001; Niwa et al., 2004). In addition, sparse occurrences of fusulinids and radiolarians from sandstone and tuff at Rosse-Kanayama indicate the presence of various lithologies ranging in age from the Late Carboniferous to Middle Permian (Tazawa et al., 1993, 2000; Umeda and Ezaki, 1997). In contrast, no age-diagnostic fossils have been reported from the "Moribu Formation" in the Hongo area. In the present study, we reinvestigated the stratigraphy and sandstone composition of Permian strata in the Hongo-Moribu area. The U-Pb ages of detrital zircons from sandstone of the Moribu Formation are also reported.

In the present study, the "Moribu Formation" in the Hongo area is subdivided into units I to IV based on their lithology. Unit I consists of dark gray fine- to medium-grained sandstone with interbedded limestone. Units II to IV are characterized by dark gray fine- to medium-grained sandstone and alternating sandstone and shale. These characteristics are similar to the lower to upper parts of the Moribu Formation in the type locality. This correlation indicates that the stratigraphy of the "Moribu Formation" in the Hongo area lacks the basal part consisting of conglomerate of the type locality. We collected 10 sandstone samples from units I to IV in the Hongo area. Based on the result of modal analysis, the sandstones can be classified as feldspathic to lithic wacke. Qm-F-Lt ternary diagram shows that the examined sandstones plot in the dissected arc to basement uplift fields proposed by Dickinson et al. (1983). According to Yoshida and Tazawa (2000), the sandstones of the basal to middle parts of the Moribu Formation are characterized by the composition of undissected arc to basement uplift. Therefore, our result indicates that a more extensive distribution of a granitic basement was present in the provenance of the Permian strata.

The U-Pb ages of detrital zircons were examined for medium-grained sandstone of the middle part of the Moribu Formation. A clear youngest age peak of 272.4 ± 2.6 Ma was recognized, which corresponds to late Kungurian to early Roadian. This result is in good agreement with biostratigraphic age constraints by fusulinids and brachiopods for the formation.

Keywords: Permian, Hida-gaien belt, sandstone composition, detrital zircon, U-Pb age