New trionychoid specimens and turtle fauna from the Lower Cretaceous Kitadani Formation of the Tetori Group in central Japan

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Background. The Trionychoidea were dominant turtles in the Late Cretaceous of Asia and North America. Although Early Cretaceous trionychoids are quite important to reveal their origin and the early evolution, their fossil records are very poor so far. The Lower Cretaceous Kitadani Formation of the Tetori Group is one of the most productive dinosaur-bearing beds of Japan, and has yielded a lot of turtle remains. Trionychid, adocid, and nanhsiungchelyid were published as the oldest records by Hirayama (2002). Herein, we report new information about trionychid and adocid turtles from the Kitadani Formation.

Methods. We examined and morphologically described more than 700 materials (mostly isolated shell fragments) from the Kitadani Formation (late Barremian to Aptian) of the Tetori Group in Katsuyama City, Fukui Prefecture, central Japan. All specimens have been collected in the paleontological excavations by Fukui Prefectural Dinosaur Museum since 1988.

Results. The turtle fauna consists of four trionychoid taxa and two other eucryptodires. About 80 % are assigned to the Trionychoidea including a trionychid, two taxa of adocids, and a nanhsiungchelyid. Shell and skeletal assemblages of a soft-shelled turtle (FPDM-V9487, 9489) were newly discovered. These have the following synapomorphies as the Trionychidae; vermiculated shell sculpturing, loss of scale sulci, lack of peripheral bones, reduction of plastron, no osseous bridge between carapace and plastron. Furthermore, a reduction of eighth costal, and an indistinct sculpture and callosity on the hypoplastron are common characters in *Perochelys*, *Gobiapalone*, and Apalonina. The Adocidae, an extinct semi-aquatic turtle, is the most dominant among turtles in this locality and is composed of two different taxa. Nearly complete shell materials of *Adocus* sp. have been recovered based on hundreds of fragmentary shell materials and the newly collected shell assemblage of one individual (FPDM-V9173).

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Another adocid, gen. et sp. indet., is newly recognized on the basis of costals, peripherals, and a hypoplastron. This adocid is distinguished from *Adocus* sp. by the possession of the marginal scales limited within peripherals, and thinner shells.

Discussion. Trionychoids from the Kitadani Formation were composed of dominant families in the Late Cretaceous of Asia and North America. Trionychoids from underlying Kuwajima and Akaiwa formations (Hauterivian to Barremian) of the Tetori Group are quite different. More primitive trionychoids such as "Trionychoidea indet." and *Kappachelys okurai* have been unearthed from these formations. This stratigraphical succession suggests that morphological and paleoecological diversification among trionychoid turtles began during the Barremian or Aptian in East Asia. Fossil turtles from the Tetori Group could shed light on the early evolution of trionychoid families.