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Review of Cenozoic terrestrial turtles (Class Reptilia: Order Testudines) from Japan

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Cenozoic sediments of Japanese Islands are yielding diversified terrestrial turtles from the Early Eocene to Late Pleistocene. Middle Miocene of Southwestern Japan, Pliocene Tsubusagawa Formation of Oita Prefecture, Pleistocene of Ryukyu Islands, and Pleistocene fissure deposits of Honshu Island are especially important localities. They are all cryptodires, including Geoemydidae, Testudinidae, Trionychidae, and Platysternidae.

Ocadia nipponica is a large geoemydid (33 cm long shell), based on a nearly complete skeleton from the Middle Pleistocene Kiyokawa Formation of Chiba Prefecture. Same taxon has been found from the Pleistocene deposits of Nagasaki, Hyogo, Osaka, Shiga, Shizuoka, and Kanagawa Prefectures. Smaller geoemydids are represented by *Mauremys yabei* and *Cuora miyatai* from the Pleistocene fissure deposits of Tochigi Prefecture. Additional materials of *M. yabei* have been collected from the Pleistocene of Chiba, Kanagawa, Shizuoka, Nagasaki Prefectures, and the Miyako Group of Okinawa Prefecture. *C. miyatai* are also known from the Pleistocene of Yamaguchi and Oita Prefectures. More primitive unnamed taxon of the genus *Cuora* is known from the Late Pleistocene of Okinawa Island. *O. nipponica* is closely related with living *O. sinensis* of Taiwan, Southern China, and Vietnam. *M. yabei* is most similar to extant *M. japonica*, possibly ancestral form of the latter. *C. miyatai* is most similar to living *C. flavomarginata* among this genus. *Geoemyda japonica*, an endemic living species, is known since the Early Pleistocene of Ryukyu Islands, whereas extinct taxon of this genus, *G. amamiensis*, is reported from the Tokunoshima Island. These materials demonstrate diverse endemic geoemydid turtles were once established in the Pleistocene of Japanese Islands, whereas today only two species, *M. japonica* and *G. japonica*, are survived.

Large geoemydids like *O. nipponica* are known from the Early Miocene of Iwate, Okayama, Shimane, Nagasaki, and Kagoshima Prefectures. They are distinguished from the Pleistocene materials in the possession of weak secondary palate and thick shell. Geoemydids identified as *Geoemyda* and *Malayemys* are collected from the Early Miocene of Gifu Prefecture and Late Oligocene of Nagasaki Prefecture respectively. These Tertiary geoemydids from Japan are oldest known record of each genus.

Manouria oyamai is an extinct testudinid once widely distributed in the Ryukyu Islands, possibly terminated by human activities. *Geoclemmys matuuraensis* and *Geoemyda takasago* are considered as small testudinids from the Paleogene deposits of Kyushu Island.

Fragmentary remains of trionychid turtles are often found from the Cenozoic sediments from Hokkaido to Okinawa Prefectures. Of these, large trionychid specimens from the Middle Eocene to Early Miocene deposits are identified as the genus *Rafetus* based on small eighth costal plates. Early Miocene trionychids are usually found from the shallow marine or blackish deposits. Living *Pelodiscus sinensis* is found from the Pliocene of Oita Prefecture, whereas its Pleistocene material has never been discovered.

Isolate cranial materials of Platysternidae are found from the Pliocene of Oita Prefecture and Pleistocene of Okinawa Island. These are only known fossil record of this family with certainty.

Terrestrial turtles from the Cenozoic sediments of Japan would be extremely important materials for understanding paleogeography, paleoclimate, and human activities in this area.

Keywords: Cenozoic, turtles, organic diversification, paleogeography, paleoclimate