Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

BPT27-01 Room:101A Time:May 25 13:45-14:00

Review of fossil chelonioid sea turtles (Class Reptilia: Order Testudines: Chelonioidea) from Japan

HIRAYAMA, Ren[1*]

[1]SILS, Waseda University

Chelonioidea is the group of marine turtles appeared in the Early Cretaceous, about 110 m.y.a. Their limbs are modified as paddles for swimming, and lachrymal glands are enlarged for excluding salt. Diversified chelonioids from Japan are allocated into three families, Cheloniidae, Dermochelyidae and extinct Protostegidae.

Upper Cretaceous Yezo Supergroup of Hokkaido Prefecture, northern Japan, including Middle and Yezo Groups, and Hakobuchi Group, has been yielding more than 100 specimens of chelonioid sea turtles. Most specimens are fragmentary and contained in the calcareous concretions weathered out from sediments, although they are well preserved uncrushed bones after acid preparation. Desmatochelys lowii is a protostegid from the Middle Turonian of Yubari, including skull, lower jaw, and limb bones of one individual as estimated with 1 m long carapace. This represents the oldest known chelonioid in Japan. Partial shells of the genus Protostega, advanced large protostegid, are found from the Coniacian of Yubari and the Santonian of Mikasa. Mesodermochelys sp., a primitive dermochelyid with carapace less than 1 m long, is the most dominant sea turtles in the Santonian of Hokkaido Prefecture. Scute was already lost in Mesodermochelys sp. Undescribed small protostegid with about 60 cm long carapace is also known from the Santonian, characterized by keeled neurals and retention of scute. Mesodermochelys undulatus was an almost exclusive chelonioid species from the Campanian to the Early Maastrichtian of Japan. M. undulatus has more massive peripherals and pelvic girdle, and its carapace is reaching up to 1.5 m long. This species is particularly abundant in the Maastrichtian Hakobuchi Group of Hobetsu area of Mukawa-cho of Hokkaido Prefecture. M. undulatus is also known from the Late Campanian to Early Maastrichtian Izumi Group of Hyogo and Kagawa Prefectures, western Japan. An isolated humerus is about 50 cm long, suggesting an individual with almost 2 m long carapace.

The Late Cretaceous chelonioids of Japan show the following history:

1: Protostegids were dominant during the Turonian and Coniacian.

2: Primitive dermochelyid, Mesodermochelys sp., appeared and became dominant in the Santonian.

3: Larger dermochelyid, M. undulatus, was almost exclusive sea turtles during the Campanian and Maastrichtian. Several turtle egg shells have been collected from the Turonian to Santonian marine deposits of Hokkaido Prefecture. They might be derived from protostegids based on temporal distribution of turtles.

Dermochelyid dominant assemblage of Japan was unique, different from those of North America and Western Europe with Cheloniidae dominant assemblage. Such provincialism among chelonioids are quite distinct from the cosmopolitan geographical distribution of marine turtles after K-T boundary. Such difference might be related with changing pattern of marine currents affected by the continental drift.

Early Oligocene undescribed cheloniids with 30 cm long carapace from Saga Prefecture, western Japan, are the earliest occurrence of Cenozoic chelonioids in Japan. Syllomus aegyptiacus, an aberrant cheloniid with about 50 cm long carapace, is the most abundant Neogene chelonioids; more than 60 specimens, including skulls, have been collected from the Miocene sediments of Toyama, Gunma, Saitama, and Chiba Prefectures. This species was cosmopolitan in geographical distribution, known from Egypt, USA, and Italy. Procolpochelys susaensis, another cheloniid, from the early Middle Miocene of Yamaguchi Prefecture, western Japan, is characterized by fifth vertebral overlying the seventh costals and neural. Right scapula of dermochelyid Psephophorus is known from the Pliocene of Hokkaido Prefecture.

Fossil sea turtles of Japan would be important materials for understanding paleobiogeography and paleoenvironments of marine ecosystem.

Keywords: Mesozoic and Cenozoic, turtles, Chelonioidea, organic diversification, paleogeography, oceanic environment

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

BPT27-02 Room:101A Time:May 25 14:00-14:15

Mammalian Fauna and its paleoenvironments of the Late Miocene Samburu Hills and Nakali, Rift Valley, Kenya

NAKAYA, Hideo[1*], Mayu Onodera[1], YAMADA, Eisuke[1], KUNIMATSU, Yutaka[2], NAKATSUKASA, Masato[2], SAKAI, Tetsuya[3]

[1]Dept. Earth & Environmental Sci., Graduate Sch. Sci. & Engineer., Kagoshima University, [2]Lab. Physical Anthropology, Graduate Sch. Sci., Kyoto University, [3]Dept. Geoscience, Inter. Fac. Sci. & Engineer., Shimane University

Rich and various mammalian fossils including hominoids were found from the Late Miocene Namurungule (Samburu Hills) and Nakali Formation. The ages of Namurungule Formation have been dated as 9.6 Ma. and the Nakali Formation have been dated as 9.8 to 9.9 Ma. Only three early Late Miocene hominoids sites are known in East Africa: Samburu Hills, Nakali, and Chorora (10 to 11 Ma). The mammalian assssemblage from the Namurungule Formation bears a close resemblance to that from the Nakali Formation. We analyzed mesowear of Hipparion and bovids teeth from both formations to evaluate their diets and compare paleoenvironments at these sites. Furthermore, we described rodents from the Nakali Formation.

Data from mesowear analysis indicate that *Hipparion* and bovids from the Nakali Formation were mixed-feeder whereas *Hipparion* and bovids from the Namurungule Formation were grazer and mixed-feeder, respectively. Comparison of the rodents from the Nakali Formation with phylogenetically close or morphologically resembling extant rodents suggested that habitat of fossil rodents was woodland and waterland under seasonal climate in highland.

These contrasting paleoenvironments may reflect an altitudinal difference (highland Nakali vs. lowland Namurungule), not necessarily an environmental change through a narrow age gap in the early Late Miocene between these sites. This interpretation is supported from the evaporite of the Aka Aiteputh Formation (15 Ma) overlain by the Namurungule Formation. Arid climate probably continued through the Middle Miocene to the Late Miocne in the Samburu Hills. Our paleoenvironmental reconstruction delivers an explanation for the richness and the paucity of primate fauna in Nakali and Namurungule, respectively.

The following conclusions are reached: The paleoenvironment of the Nakali Formation may have been a woodland under seasonal climate while that of the Namurungule Formation may have been an openland under arid climate. This environmental difference between the Nakali and Namurungule Formations is also supported by stable isotope analysis, pollen analysis, and sedimentological analysis.

Keywords: Late Miocene, Kenya, Mammal, Paleoenvironments, Fauna, Human evolution

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

BPT27-03 Room:101A Time:May 25 14:15-14:30

Phylogenetic analysis of all living leporid genera based on the morphology of skull, jaw, and dentition

TOMIDA, Yukimitsu[1*], Tomoyuki Ohashi[2], Changzhu Jin[3]

[1]National Mus. Nature & Science, Japan, [2]Kitakyushu Mus. Nat. Hist. & Human Hist., [3]Inst. Vert. Paleont. Paleoanthrop., CAS

Extant family Leporidae is a relatively small group, consisting of 11 genera, which are rather homogenous in general morphology. Supra-generic and phylogenetic classification of the family has been based mainly on dental (particularly p3) morphology. Molecular cladistic studies that became common during 1990's have been applied on leporids also, and a phylogenetic study based on multiple molecular data of nuclear and mitochondodria was published by Matthee et al. in 2004. But, their result was nearly totally different from the previous one based mainly on the dental morphology.

We started in 2004 and have continued a cladistic phylogenetic analysis of all living genera of the family Leporidae, based on the morphology of the skull, jaw, and dentition, which are applicable on fossils, assuming that extinct genera should be included as much as possible in the future. Extant 11 genera of the family (*Pronolagus* includes 2 different species) and *Ochotona* as an outgroup (13 taxa in total) were analyzed with 47 (25 clanial, 7 mandibular, and 15 dental) characters. Cladistic analysis of those data by PAUP 4 provides 10 most parsimonious trees (MPT) by branch and bound search, and the strict and 50 % majority consensus trees were obtained from them. These trees are quite different from Matthee et al. (2004) and also differ in some part from the one based mainly on the dental morphology.

On 50 % majority consensus tree, the basal tree pattern is relatively conformable with place of origin and distributional diffusion. *Caprolagus* and *Poelagus* consist of a monophyletic group, and *Pentalagus* locates next to them as their sister group. *Poelagus* was originally described as a subgenus of *Caprolagus*, and our result shows their close relationships. Excluding these 3 genera and *Nesolagus* whose distribution is restricted in Asia, the other 7 genera consist of a monophyletic group. Among them, *Romerolagus* and *Brachylagus* are restricted in North America in distribution and have been thought to be primitive, which is conformable with our result. *Lepus*, *Sylvilagus*, and *Oryctolagus* have been considered to have close a relationship to each other, and this relationship is also supported by our result. *Bunolagus* and *Pronolagu* consist of a monophyletic group, and this point is conformable with their close relationship traditionally thought. But, the point where both genera thought to be closely related to *Pentalagus* because of having 5 reentrant angles on p3 does not agree with our result. It is suggested that this character may be obtained independently from *Pentalagus*.

Kriegs et al. (2010) recently analyzed phylogenetic relationships of some leporid genera based on retroposon insertions. Although number of genera included is limited, they demonstrated that *Lepu* branched off at last. This clearly differs from the results by Matthee et al. (2004) and might support our results. Their paper can be highly evaluated in that they showed the molecular phylogeny by Matthee et al. may not be a "winning hit", and it can be expected that phylogenetic estimations by molecules and by morphology will be conformable in the future.

Keywords: phylogeny, cladistic analysis, Leporidae, skull, dentition

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

BPT27-04 Room:101A Time:May 25 14:30-14:45

Evolutionary history of macaques in East Asia: internal cranial morphology and its phylogenetic significance

ITO, Tsuyoshi[1*], NISHIMURA, Takeshi[1], TAKAI, Masanaru[1]

[1]Primate Research Institute, Kyoto University

Macaca is one of the most successful genera of nonhuman primates. Macaques are usually classified into four species groups. The *fascicularis* and *sinica* groups are distributed widely from tropical to temperate zones in Asia; the former is more widely distributed in higher-latitude regions than the latter. The phylogenetic relationship of northern Chinese fossil species, *M. anderssoni* (Early Pleistocene, Mianchi), to living species is one of the key issues for interpreting paleobiogeographic events, but there is still controversial about whether *M. anderssoni* is phylogenetically related to the *sinica* group or the *fascicularis* group. The present study evaluated phylogenetic values of internal cranial variations in macaques to reappraise the phylogenetic position of *M. anderssoni*. Results indicated that nasal cavity shape well reflects phylogenetic relationships rather than environmental influences. Parsimonious reconstruction indicated that pear-shaped nasal cavity shown in members of the *sinica* group is derived condition among macaques. *M. anderssoni* shares pear-shaped nasal cavity with some living species of the *sinica* group, suggesting their phylogenetic closeness. The results of this work indicate that population of the *sinica* group was widely distributed in northern China during the Early to Middle Pleistocene, but they retreated southward into southern China and Indochina. On the other hand, the *fascicularis* group dispersed from Southeast Asia to East Asia since the Middle Pleistocene and acquired wide distribution in high latitude regions. Thus, in East Asia, the *sinica* group was replaced by the latecomer, the *fascicularis* group, probably due to the deterioration of climate during the Late Pleistocene.

Keywords: Pleistocene, Paleobiogeography, Nasal cavity, Maxillary sinus, Computed tomography, *Macaca anderssoni*

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

BPT27-05 Room:101A Time:May 25 14:45-15:00

Evolutionary history of Rhinopithecus (snub-nosed monkey) in East Asia

TAKAI, Masanaru[1*], Chun-Hsiang Chang[2]

[1]Primate Research Institute, Kyoto University, [2]National Museum of Natural Science, Taiwan

Rhinopithecus, snub-nosed monkey or golden monkey, is a relatively large, folivorous monkeys that are vicariantly distributed from southern China to Southeast Asia at present. It is usually classified into four species, all of which are now on the merge of extinction. However, the fossil record of the genus is relatively rich: many fossil specimens have been reported from the early to late Pleistocene sediments of China, suggesting their wide distribution during the Pleistocene in East Asia. Recently we reported *Rhinopithecus* fossils from the early/middle Pleistocene of Chochen locality, southern Taiwan, where only macaque monkey, *Macaca cyclopis*, now occur. In Taiwan *Rhinopithecus* presumably became extinct in the late Pleistocene, probably owing to global cooling and vegetation change, whereas macaques, which is of almost the same body size as *Rhinopithecus*, survived to the present. The contrasting history of survival between the two kinds of monkeys may be due to ecological/behavioral differences between them or as a result of accidental events that occurred in the Pleistocene of Taiwan.

Keywords: Rhinopithecus, Taiwan, evolutionary history, Pleistocene, fossil

Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

BPT27-06 Room:101A Time:May 25 15:00-15:15

A review of early Pleistocene Gigantopithecus fauna from south China

JIN, Changzhu[1]*

[1]Institute of Vertebrate Paleontology and Paleoanthropology, Chinese Academy of Sciences

Among the most important Quaternary mammalian faunas, the *Gigantopithecus blacki* fauna from south China has received a good deal of attention. As the largest primate fossil all over the world, *G. blacki* was firstly found from a Chinese traditional medicine store in Hongkong and named by the Dutch paleontologist Von Koenigswald in 1935.

Twenty years later (1956), Pei WZ with his team firstly discovered the *G. blacki* and associated mammalian fossils with reliable geological horizon in Quaternary cave sediments in Daxin, Guangxi Province, south China. Since then, there have been at least 13 Pleistocene *G. blacki* localities discovered across 5 provinces in south China. The *G. blacki* fossils all come from the Karst cave deposits well developing in the south China bare calcareous Karst rocks and locate in the Oriental (Fig. 1).

The Karst caves nearby Chongzuo area in Guangxi, south China, contain a plethora of Quaternary mammalian remains, especially the conspicuous fossils of *G. blacki* and Hominoid. During the past few years' excavations in this area, six new *Gigantopithecus* layers belonging to different ages of Quaternary have been found. The six newly discovered *Gigantopithecus* cave sites (viz. Baikong Cave, Boyue Cave, Sanhe Cave, Queque Cave, Hejiang Cave, and Shuangtan Cave) all distribute in or nearby the Chongzuo Eco-Park, which belongs to the north tropical zone.

In this area, six vertical horizons of caves have been recognized. The sediments of the karst caves of the fifth horizon with an elevation of about 200 m above sea level yield the early Pleistocene *Gigantopithecus* fossils (e.g. Baikong Cave, Boyue Cave, Sanhe Cave and Queque Cave). Meanwhile, middle Pleistocene *Gigantopithecus* fossils have mainly been discovered from caves in the fourth layer (e.g. Hejiang Cave), which is about 180 m ASL.

Here, I report the 4 newly discovered *Gigantopithecus* cave sites in Chongzuo during the past few years' excavations: viz. Baikong Cave, Boyue Cave, Sanhe Cave and Queque Cave, belonging to the different ages of early Pleistocene. Also, the characteristics, distribution, sequence and the evolutionary stages of the early Pleistocene *Gigantopithecus* fauna will be discussed based on the newly discovered fossil materials and the chronological data.

Keywords: Gigantopithecus fauna, South China, Karst caves, Early Pleistocene, Gigantopithecus blacki, sequence and evolution stages