Proceedings of the Zoological Institute RAS
Vol. 312, Nos. 1/2, 2008, pp. 3–25

УДК 568.132:56(116)(5)

NEW MATERIALS ON TURTLES OF THE FAMILY NANHSIUNGCHELYIDAE FROM THE CRETACEOUS OF UZBEKISTAN AND MONGOLIA, WITH A REVIEW OF THE NANHSIUNGCHELYID RECORD IN ASIA

I.G. Danilov* and E.V. Syromyatnikova

Zoological Institute of the Russian Academy of Sciences, Universitetskaya Emb., 1, St. Petersburg, 199034, Russia, e-mail: dig@mail333.com

ABSTRACT

This paper presents a review of all known records of turtles of the family Nanhsiungchelyidae in Asia, including data from 37 localities. Among new materials described herein are remains of nanhsiungchelyids (*Hanbogdemys* sp. 1 and 2 and Nanhsiungchelyidae indet. 1–10) from 12 Early and Late Cretaceous localities of Mongolia and Uzbekistan. Nanhsiungchelyidae from the Early Cretaceous (Aptian–Albian) of Mongolia are reported for the first time. Reassessment of the published data on Asian nanhsiungchelyids allows us to change taxonomic status of many previous findings from *Basilemys* sp. or *Zangerlia* sp. to Nanhsiungchelyidae indet. In addition, we refer *Bulganemys jaganchobili* to *Hanbogdemys*. The latter genus thus has the widest temporal distribution (from Cenomanian to Campanian) among nanhsiungchelyids in Asia. Our analysis of the nanhsiungchelyid record in Asia shows that the record is richest in the Cenomanian–Campanian of Mongolia, whereas the Maastrichtian record from Mongolia should be considered questionable. These facts emphasize the particular importance of the Mongolian record of nanhsiungchelyids for understanding the diversification and evolution of this group.

Key words: Asia, Cretaceous, Nanhsiungchelyidae, turtles

РЕЗЮМЕ

В статье представлен обзор всех известных находок черепах семейства Nanhsiungchelyidae в Азии, включающий данные из 37 местонахождений. Среди новых материалов, описываемых в статье, остатки наньсюнгхелиид (*Hanbogdemys* sp. 1 и 2 и Nanhsiungchelyidae indet. 1–10) из 12 нижне- и верхнемеловых местонахождений Монголии и Узбекистана. Наньсюнгхелииды из нижнего мела (апт–альб) Монголии описываются впервые. Пересмотр опубликованных данных по азиатским наньсюнгхелиидам позволяет нам изменить таксономический статус многих прежних находок с *Basilemys* sp. или *Zangerlia* sp. на Nanhsiungchelyidae indet. Помимо этого, мы помещаем *Bulganemys jaganchobili* в состав рода *Hanbogdemys*, что делает этот род самым широко распространенным (с сеномана по кампан) среди азиатских наньсюнгхелиид. Проведенный нами анализ находок наньсюнгхелиид в Азии показывает, что большая их часть происходит из сеномана–кампана Монголии, в то время как находки из маастрихта Монголии следует считать спорными. Эти факты подчеркивают особую важность монгольских находок наньсюнгхелиид для понимания диверсификации и эволюции этой группы.

---

* Corresponding author.

INTRODUCTION

Nanhsiungchelyidae Yeh, 1966 are a group of cryptodiran turtles, known only from the Cretaceous of Asia and North America and that possesses a peculiar combination of aquatic and terrestrial features (Hutchison 2000; Sukhanov 2000). According to recent knowledge, nanhsiungchelyids first appeared in Asia in the Early Cretaceous (Barremian or Aptian) and then in North America in the Late Cretaceous, beginning with the Coniacian-Santonian; their distribution on both continents extends into the Maastrichtian (Hutchison 2000; Hirayama 2002). Phylogenetic studies clearly demonstrate that Asian nanhsiungchelyids gave rise to North American ones (Brinkman and Nicholls 1993; Brinkman and Peng 1996; Hirayama et al. 2001; Joyce and Norell 2005; Sukhanov et al. in press). In spite of significant progress in the study of nanhsiungchelyids during last decade, this group remains poorly known. This is especially true for the Asian record of nanhsiungchelyids, which is represented, besides a few more or less complete specimens, mostly by fragmentary remains which allow only higher level determinations and need verification. Even with these fragmentary materials, the nanhsiungchelyid record in Asia is very incomplete. As a result there are still many gaps and questions regarding their geographical and geological distribution. A preliminary list of nanhsiungchelyid records in Asia, including 25 occurrences, was recently presented by Sukhanov et al. (in press). The aim of our paper is to give a more complete review of this record, including description of new findings and some previously undescribed materials.

The Nanhsiungchelyidae are considered to be the sister group of the Adocidae Cope, 1870 (Meylan and Gaffney 1989; Brinkman and Nicholls 1993; Brinkman 1998; Danilov and Parham 2006; Joyce 2007). Here we follow phylogenetic definitions of both groups given by Joyce and Norell (2005). Both groups have somewhat similar morphology and distribution, except that adocids are known also in the Paleogene of Asia and North America. They often occur in the same assemblages of the Cretaceous and, when represented by fragmentary remains, nanhsiungchelyids are sometimes mistaken for adocids. Characters which allow differentiation between these groups are summarized in Table 1. The specimens (shell fragments) described in this paper (see Systematics section) in most cases were diagnosed based on a combination of several of these characters, of which sculpturing of the shell surface with relatively big and irregular grooves and pits (hereinafter – nanhsiungchelyid sculpturing) was always present. For this reason, and due to unknown variation of the nanhsiungchelyid sculpturing, the sculpturing is omitted from further consideration.

Anatomical terms of the shell follows Zangerl (1969) and Hutchison and Bramble (1981). Names of localities and formations/svitas are given according to literature data or transliterated from Russian.

MATERIAL

In addition to materials described in the Systematics section, our study relies on published data on the following taxa of nanhsiungchelyids for comparative purposes: *Anomalochelys angulata* Hirayama et al., 2001 (Hirayama et al. 2001); species of *Basilemys* Hay, 1902: *B. variolosa* (Cope, 1876) (Langston 1956); *B. nobilis* Hay, 1911 (Langston 1956); *B. sinuosa* Riggs, 1906 (Riggs 1906); *B. praeclara* Hay, 1911 (Brinkman and Nicholls 1993); *Hanbogdemys orientalis* (Sukhanov et Narmandakh, 1975) (Sukhanov and Narmandakh 1975, 1977); *Nanhsiungchelys wuchingensis* Yeh, 1966 (Yeh 1966; Hirayama et al. 2001); species of *Zangerlia* Młynarski, 1972: *Z. dzamynchondi* Sukhanov et Narmandakh, 2006 (Sukhanov 2000; Sukhanov and Narmandakh 2006); *Z. neimongolensis* Brinkman et Peng, 1996 (Brinkman and Peng 1996); *Z. testudinimorpha* Młynarski, 1972 (Młynarski 1972); *Z. ukhaachelys* Joyce et Norell, 2005 (Joyce and Norell 2005).

Institutional abbreviations. AMNH – American Museum of Natural History, New York, USA; CCMGE – Chernyshev's Central Museum of Geological Exploration, St. Petersburg, Russia; PIN – Paleontological Institute, Russian Academy of Sciences, Moscow, Russia; ZIN PH – Paleoherpetological collection, Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia; ZPAL – Institute of Paleobiology, Polish Academy of Sciences, Warsaw, Poland.

REVIEW OF RECORDS OF THE NANHSIUNGCHELYIDAE IN ASIA

The following is a review of 37 records of the nanhsiungchelyid turtles in Asia given in alphabetic order of localities. All of these records, except un-

Table 1. Differences in the shell morphology between adocids and nanhsiungchelyids. Data on adocids and nanhsiungchelyids are taken from various publications (see for references: Meylan and Gaffney 1989; Danilov et al. 2007; Sukhanov et al. in press).

Characters	Adocidae	Nanhsiungchelyidae
Sculpturing of the shell	With relatively small and regular grooves and pits	With relatively big and irregular grooves and pits
Scale sulci	Narrow and shallow	Wide and deep
Number of neurals	Six or seven	Eight or seven
Number of suprapygals	One or two	Two
Ribheads and rib thickenings of costals	Weak	Normally developed
Pygal	Longer than wide	Wider than long
Position of pleural-marginal sulcus	On peripherals and sometimes on costals	On peripherals
Plastral bridges (minimal length)	Short (less than 50% of plastron length)	Long (usually 50% or more of plastron length)
Posterior plastral lobe length	Long (usually more than 30% of plastron length)	Short (less than 30% of plastron length)
Pectoral contribution to the axillary rim	Present	Absent
Ventromedial edge of marginal 6	Not expanded	Expanded
Overlapping of scales on to the dorsal surface of plastral lobes	Absent	Present

known localities (Nos. 36 and 37), are represented in Fig. 1. The record of *Basilemys* sp. from the Upper Cretaceous of Shakh-Shakh locality in Kazakhstan (Kuznetsov 1977, p. 124; Kuznetsov and Chkhikvadze 1987, p. 33) belongs to *Adocus* Cope, 1868 (Adocidae; Nessov 1997, p. 109; personal observation of IGD). The record of Nanhsiungchelyidae indet. from the Lower Cretaceous of Endrengiyn Nuru locality in Mongolia mentioned by Syromyatnikova and Danilov (2008) is a mistake.

1. Abdrant Nuru, Umnegov Aimag (Southern Gobi), Mongolia.

Geology and age. Djadokhta Formation, Campanian (Suzuki and Narmandakh, 2004).

Material and references. Three shell fragments of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 10, pl. 2, fig. 1).

2. Amagimi Dam of Mifune, Kumamoto Prefecture, Kyushu, Japan.

Geology and age. Mifune Group, Coniacian – Santonian (Hirayama 1998; pers. comm. to IGD 2007).

Material and references. Two shell fragments of Nanhsiungchelyidae indet. (as *Basilemys* sp., Hirayama 1998, p. 88, pl. 2, figs. a, b).

Remarks. The attribution of the shell fragments from Amagimi Dam to *Basilemys* sp. by Hirayama (1998) was based on position of the pleural-marginal sulcus far from the medial border of the available peripheral. However, this character is known, besides in species of *Basilemys*, in *Zangerlia dzamynchondi* (Sukhanov 2000; Sukhanov and Narmandakh 2006) and probably in some other Asian nanhsiungchelyids (see Nanhsiungchelyidae indet. 6 in the Systematics section). For this reason, until more information is available, this record should be tentatively considered as Nanhsiungchelyidae indet.

3. Amtgai (=Amtgai Khuduk), Dornogov Aimag (Eastern Gobi), Mongolia.

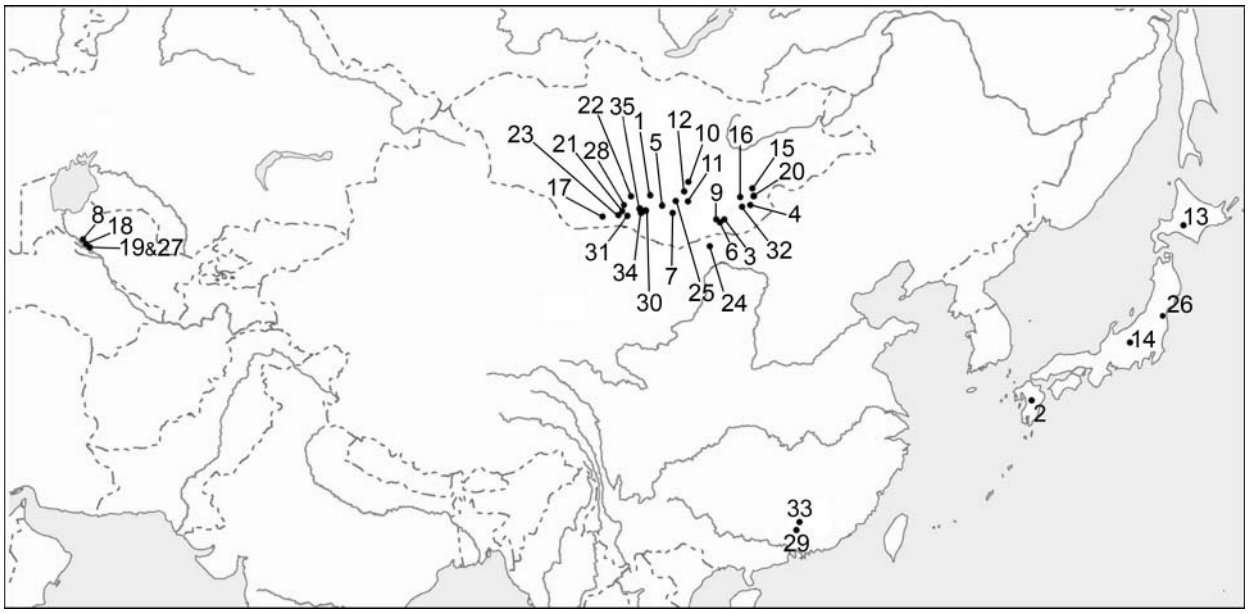

Fig. 1. Map showing all known occurrences of the nanhsiungchelyid turtles in Asia: 1 – Abdrant Nuru; 2 – Amagimi Dam of Mifune; 3 – Amtgai; 4 – Bain Shire; 5 – Bayn Dzak; 6 – Bayshin Tsav; 7 – Boro Khamarin; 8 – Chelpyk; 9 – Deng Usu; 10 – Dohoin Usu; 11 – Dzun Bayan; 12 – Erdeni Ula; 13 – Hobetsu-cho; 14 – Katsuyama; 15 – Khamaryn Khural; 16 – Khara Khutul; 17 – Khermeen Tsav II; 18 – Khodzhakul I; 19 – Khodzhakulsay; 20 – Khongil Tsav; 21 – Khulsan; 22 – Khuren Tsav; 23 – Nemegt; 24 – Nuchidaba; 25 – Olgoy Ulan Tsav; 26 – Oriki; 27 – Shekhdzheili II; 28 – Shiregin Gashun; 29 – Shixing County; 30 – Udyn Sayr; 31 – Ukhaa Tolgod; 32 – Ushyin Khuduk; 33 – Wujing; 34 – Yagaan Khovil; 35 – Zamin Khond. See text for data on geology, age and material.

Geology and age. Bainshire Formation, Cenomanian – Santonian (see Remarks).

Material and references. An incomplete anterior plastral lobe of *Hanbogdemys* sp. (as *Basilemys orientalis*; Sukhanov and Narmandakh 1977, pp. 57, 77, fig. 5a); shell fragments of Nanhsiungchelyidae indet. (as *Zangerlia* sp.; Shuvalov and Chkhikvadze 1979, p. 67); isolated shell fragments from one individual of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 8, pl. 1, fig. 5).

Remarks. *Hanbogdemys* from the Amtgai show some differences in morphology of the epiplastra from *H. orientalis*, to which it was assigned by Sukhanov and Narmandakh (1977). Given that the age of the Amtgai *Hanbogdemys* may be different from those of *H. orientalis* (see below), these differences may be specific rather than ontogenetic as supposed by the previous authors (Sukhanov and Narmandakh 1977). For this reason, until more information is available, we consider this record as *Hanbogdemys* sp.

Zangerlia sp. from the Amtgai was mentioned without description, illustration and any evidence for its systematic assignment. For this reason, until more information is available, this record should be tentatively considered as Nanhsiungchelyidae indet.

Suzuki and Narmandakh (2004, p. 8, 9) indicated "1 specimen" of Nanhsiungchelyidae from this locality, whereas four shell fragments were figured (ibid., pl. 1, fig. 5), probably suggesting that they are from one individual.

There is a disagreement in the literature about what part of the Bainshire Formation is exposed in the Amtgai. According to Shuvalov and Chkhikvadze (1979), this is the lower part, whereas Narmandakh (1985) indicates the upper part of the Bainshire Formation. Other authors (Sukhanov and Narmandakh 1977; Jerzykiewicz and Russell 1991; Suzuki and Narmandakh 2004) do not distinguish parts of the Bainshire Formation in this locality, the approach we follow herein.

4. Bain Shire (=Bayn Shire), Dornogov Aimag (Eastern Gobi), Mongolia.

Geology and age. Bainshire Formation, Cenomanian – Santonian (Jerzykiewicz and Russell 1991; Suzuki and Narmandakh 2004).

Material and references. A shell fragment of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 8).

5. Bayn Dzak (=Shabarakh Usu), Umnegov Aimag (Southern Gobi), Mongolia.

Geology and age. Djadokhta Formation, Campanian (Jerzykiewicz 2000; Suzuki and Narmandakh 2004).

Material and references. Two partial shells of Nanhsiungchelyidae indet. 1 (as Dermatemydidae, gen. indet.; Gilmore 1931, p. 223; as *Basilemys* sp., Sukhanov and Narmandakh 1975, p. 94), see description in the Systematics section; a shell of Nanhsiungchelyidae indet. (as Trionychidae; Trofimov and Chudinov 1970, p. 154; as *Basilemys* sp.; Sukhanov and Narmandakh 1975, p. 94); one specimen of Nanhsiungchelyidae indet., "in which the carapace and plastron were articulated" (Suzuki and Narmandakh 2004, p. 8).

6. Bayshin Tsav, Dornogov Aimag (Eastern Gobi), Mongolia.

Geology and age. Upper part of the Bainshire Formation, late Turonian–Santonian (Shuvalov and Chkhikvadze 1975; Sukhanov 2000).

Material and references. Isolated shell fragments of at least two individuals, shell, girdles and limbs of another individual of *Hanbogdemys orientalis* (as *Basilemys orientalis*; Sukhanov and Narmandakh 1975, p. 97, fig. 2, pl. I, figs. 1–5; 1977, p. 77, figs. 1–4, 5 ("b" and "v"), 6–10, pls. I–III; as *H. orientalis*; Sukhanov 2000, p. 340, fig. 17.23; Sukhanov and Narmandakh 2006, p. 124); a shell fragment of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 8).

7. Boro Khamarin, Umnegov Aimag (Southern Gobi), Mongolia.

Geology and age. Barungoyot Formation, Campanian (Sukhanov and Narmandakh 1975).

Material and references. Part of the carapace, girdles and limbs of one individual and an isolated fragment of the hypoplastron of another individual of Nanhsiungchelyidae indet. (as *Basilemys* sp.; Sukhanov and Narmandakh 1975, p. 99, figs. 1, 3).

Remarks. Sukhanov and Narmandakh (1975) noted similarity of these materials with *Basilemys* (now *Zangerlia*) *testudinimorpha* in the following characters: presence of a complete row of neurals, two suprapygals, of which the anterior suprapygal is smaller than the posterior one, and in the enlarged inguinal scale. However, all of these characters are present in most other nanhsiungchelyids and do not allow making certain generic assignment. For this reason, until more information available, this record should be tentatively considered as Nanhsiungchelyidae indet.

8. Chelpyk (=Tçelpyk), see Sheikhdzheili II.

9. Deng Usu, Dornogov Aimag (Eastern Gobi), Mongolia.

Geology and age. Bainshire Formation, Cenomanian–Santonian (Shuvalov and Chkhikvadze 1979).

Material and references. Shell fragments of Nanhsiungchelyidae indet. (as *Zangerlia* sp.; Shuvalov and Chkhikvadze 1979, p. 70).

Remarks. *Zangerlia* sp. from the Deng Usu was mentioned without description, illustration and any evidence for its systematic assignment. For this reason, until more information available, this record should be tentatively considered as Nanhsiungchelyidae indet.

10. Dohoin Usu, Dundgov Aimag (Middle Gobi), Mongolia.

Geology and age. Dohoin Usu Formation, ?Campanian (see Remarks).

Material and references. Isolated shell fragments of Nanhsiungchelyidae indet. 2 (as *Adocus* sp., Gilmore 1931, p. 222), see Systematics section.

Remarks. Gilmore (1931) reported that the material comes from the ?Lower Cretaceous beds of Dohoin Usu (Dohoin Usu Formation), which is now considered to be ?Campanian in age (see Weishampel et al. 2004).

11. Dzun Bayan (=Züün Bayan), Dundgov Aimag (Middle Gobi), Mongolia.

Geology and age. Baruunbayan Svita, Aptian–Albian (Shuvalov 2000).

Material. Isolated shell fragments of Nanhsiungchelyidae indet. 3, see Systematics section.

12. Erdeni Ula (=Erdene Uul), Dundgov Aimag (Middle Gobi), Mongolia.

Geology and age. Khulsangol Svita, Aptian–Albian (Khosatzkiy 1999; Shuvalov 2000).

Material. A shell fragment of Nanhsiungchelyidae indet. 4, see Systematics section.

13. Hobetsu-cho, Hokkaido Prefecture, Japan.

Geology and age. Yezo Supergroup, Cenomanian (Hirayama et al. 2001).

Material and references. Incomplete shell of *Anomalochelys angulata* (Hirayama et al. 2001, p. 129, figs. 2–6, 7c).

14. Katsuyama, Fukui Prefecture, Japan.

Geology and age. Kitadani Formation, Barremian or Aptian (Hirayama 2002).

Material and references. Nine shell fragments of Nanhsiungchelyidae indet. (as *Basilemys* sp.; Hirayama 2002, p. 35, figs. 4C, 5A–E).

Remarks. The attribution of the shell fragments from Katsuyama to *Basilemys* by Hirayama (2002) was based on position of the pleural-marginal sulcus far from the medial border of available peripherals. However, this character is known, besides species of *Basilemys*, in some other Asian nanhsiungchelyids (see Remarks section under Amagimi Dam of Mifune, above). By this reason, until more information available, this record should be tentatively considered as Nanhsiungchelyidae indet.

15. Khamaryn Khural, Dornogov Aimag (Eastern Gobi), Mongolia.

Geology and age. Hühteeg Svita, Aptian–Albian (Shuvalov 2000).

Material. Isolated shell fragments of Nanhsiungchelyidae indet. 5, see Systematics section.

16. Khara Khutul (=Khara Khutul Ula; =Khar Hötöl Uul), Dornogov Aimag (Eastern Gobi), Mongolia.

Geology and age. Lower part of the Bainshire Formation, Cenomanian – early Turonian (Kalandadze and Kurzanov 1974; Shuvalov and Chkhikvadze 1975; Shuvalov 2000).

Previous material and references. Nuchal of *Hanbogdemys* sp. 1 (as *Basilemys orientalis*; Nessov 1987, fig.13), see description in the Systematics section; isolated shell fragments of Nanhsiungchelyidae indet. (as *Charitonyx tajanikolaevae* Chkhikvadze, 1980; Chkhikvadze 1980; as ?*Zangerlia* sp.; Shuvalov and Chkhikvadze 1975, pp. 224, 225); two partial shells and additional shell fragments of a new genus and species of the Nanhsiungchelyidae (see Sukhanov et al. (in press) for discussion of all these materials and references).

New material. Isolated shell fragments of *Hanbogdemys* sp. 1 and isolated shell fragments of Nanhsiungchelyidae indet. 6, see description in the Systematics section.

17. Khermeen Tsav II, Gov-Altai Aimag (Transaltai Gobi), Mongolia.

Geology and age. Upper white bed, Nemegt Formation, Maastrichtian (Suzuki and Narmandakh 2004).

Material and references. A shell fragment of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 10, pl. 2, fig. 4).

18. Khodzhakul I, see Sheikhdzheili II.

19. Khodzhakulsay, see Sheikhdzheili II.

20. Khongil Tsav, Dornogov Aimag (Eastern Gobi), Mongolia.

Geology and age. Bainshire Formation, Cenomanian – Santonian (Suzuki and Narmandakh 2004).

Material and references. A shell fragment of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 10).

21. Khulsan, Gov-Altai Aimag (Transaltai Gobi), Mongolia.

Geology and age. Barungoyot Formation (="Lower Nemegt Beds"), Campanian (Jerzykiewicz and Russell 1991; Shuvalov 2000).

Material and references. An incomplete carapace of Nanhsiungchelyidae indet. 7 (as *Zangerlia testudinimorpha*; Młynarski 1972, p. 86).

Remarks. This specimen has never been described or figured and its assignment to *Z. testudinimorpha* was not corroborated. Herein, this specimen is considered as Nanhsiungchelyidae indet. 7, see description in the Systematics section.

22. Khuren Tsav, Gov-Altai Aimag (Transaltai Gobi), Mongolia.

Geology and age. Nemegt Formation, Maastrichtian (Shuvalov and Chkhikvadze 1975).

Material and references. A damaged shell of Nanhsiungchelyidae indet. (as ?*Zangerlia* sp.; Shuvalov and Chkhikvadze 1975, pp. 221–225).

Remarks. ?*Zangerlia* sp. from the Khuren Tsav was mentioned without description, illustration and any evidence for its systematic assignment. For this reason, until more information is available, this record should be tentatively considered as Nanhsiungchelyidae indet.

23. Nemegt, Gov-Altai Aimag (Transaltai Gobi), Mongolia.

Geology and age. Barungoyot and Nemegt formations, Campanian – Maastrichtian (Jerzykiewicz and Russell 1991; Shuvalov 2000).

Previous material and references. Incomplete shell with fragments of the right shoulder girdle and forelimb of *Zangerlia testudinimorpha* Młynarski,

1972 (Młynarski 1972, pp. 86–89, figs.1, 2, pl. XXVIII); a peripheral and a fragmentary plastron of Nanhsiungchelyidae indet. (Fig. 8D–F; as ?*Zangerlia* sp.; Młynarski and Narmandach 1972, p. 99, fig. 3; as *Basilemys* sp.; Sukhanov and Narmandakh 1975, p. 96; Jerzykiewicz and Russell 1991, p. 370).

New material. Isolated shell fragments of Nanhsiungchelyidae indet. 8, see description in the Systematics section.

Remarks. *Zangerlia testudinimorpha* was recorded from the "Lower Nemegt Beds" of the Nemegt and Khulsan localities, whereas ?*Zangerlia* sp. – from the "Upper Nemegt Beds" of the Nemegt (Młynarski 1972; Młynarski and Narmandach 1972). Later, *Z. testudinimorpha* was placed in the faunal list of the Barungoyot Formation, whereas ?*Zangerlia* sp. was mentioned as *Basilemys* sp. in the faunal list of the Nemegt Formation (Sukhanov and Narmandakh 1975; Jerzykiewicz and Russell 1991). Here, we consider the latter ?*Zangerlia* sp./ *Basilemys* sp record as Nanhsiungchelyidae indet., because it is too fragmentary to allow any generic attribution. Besides that, the precise age (formation) for the previous and new nanhsiungchelyid records from the Nemegt should be considered as unknown (see Discussion).

24. Nuchidaba, Bayan Mandahu, Inner Mongolia, China.

Geology and age. Upper Cretaceous redbeds (Brinkman and Peng 1996).

Material and references. Partial skeletons and shells of seven individuals of *Zangerlia neimongolensis* (Brinkman and Peng 1996, pp. 528–535, figs. 1, 2, 3B, 4–9).

25. Olgoy Ulan Tsav (=Algui Ulaan Tsav), Dundgov Aimag (Middle Gobi), Mongolia.

Geology and age. Baruunbayan Svita, Aptian–Albian (Shuvalov 2000).

Material. Hyoplastron of Nanhsiungchelyidae indet. 9, see description in the Systematics section.

26. Oriki, Hironomura, Fukushima Prefecture, Japan.

Geology and age. Sakurazawa conglomerate, Lower Futaba Formation, Coniacian–Santonian (Tokunaga and Shimizu 1926).

Material and references. Shell fragment of Nanhsiungchelyidae indet. (as *Basilemys* sp.; **Tokunaga and Shimizu** 1926, p. 188, pl. XXIII, fig. 3).

Remarks. Herein this fragment is considered as Nanhsiungchelyidae indet., because it is too fragmentary to allow any generic attribution.

27. Sheikhdzheili II, Chelpyk, Khodzhakul I, and Khodzhakulsay, Sultanuvais Range, Uzbekistan.

Geology and age. Khodzhakul Formation, early Cenomanian (Averianov and Archibald 2005).

Previous material and references. Several mostly undeterminable shell fragments of Nanhsiungchelyidae indet. (as *Basilemys* sp.; Nessov 1981, pl. III, fig. 11, 12; 1997, p. 138–140; pl. 32, figs. 3–7; Nessov 1987, pl. 1, fig. 14; Nessov and Krasovskaya 1984, pl. 3, fig.13; as Nanhsinugchelyididae indet. [sic.]; Nessov 1997, p.135).

New material. Isolated shell fragments of Nanhsiungchelyidae indet. 10 from the Khodzhakul I and Sheikhdzheili II, see description in the Systematics section.

28. Shiregin Gashun, Gov-Altai Aimag (Transaltai Gobi), Mongolia.

Geology and age. Upper part of the Bainshire Formation, late Turonian – Santonian (Shuvalov and Chkhikvadze 1975).

Material and references. Isolated peripheral fragments of Nanhsiungchelyidae indet. (as ?*Zangerlia* sp., Shuvalov and Chkhikvadze 1975, p. 222, pl. I, fig. 1).

Remarks. The figured peripheral from the Shiregin Gashun does not allow determination more precise than Nanhsiungchelyidae indet.

29. Shixing County, Guangdong Province, China.

Geology and age. Nanxiong Formation (=Nanxiong Group), Maastrichtian (see Remarks).

Material and references. "Separate carapace and plastron" of Nanhsiungchelyidae indet. (Yeh 1994, p. 33, 34).

Remarks. Yeh (1994) stated that the nanhsiungchelyid from the Shixing County was collected in the same horizon as *Nanhsiungchelys wuchingensis*, which is from the Maastrichtian Nanxiong Formation (see Wujing).

30. Udyn Sayr, Umnegov Aimag (Southern Gobi), Mongolia.

Geology and age. Djadokhta Formation, Campanian (Suzuki and Narmandakh 2004).

Material and references. Two shell fragments of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 10).

31. Ukhaa Tolgod, Gov-Altai Aimag (Transaltai Gobi), Mongolia.

Geology and age. Djadokhta Formation, Campanian (Joyce and Norell 2005).

Material and references. Partial cranium, plastron, peripherals and other remains of the postcranium of *Zangerlia ukhaachelys* (Joyce and Norell 2005).

32. Ushyin Khuduk, Dornogov Aimag (Eastern Gobi), Mongolia.

Geology and age. Upper part of the Bainshire Formation, late Turonian – Santonian (Shuvalov and Chkhikvadze 1979).

Material and references. Several shell fragments of Nanhsiungchelyidae indet. (as *Zangerlia* sp., Shuvalov and Chkhikvadze 1979, p. 70–71).

Remarks. *Zangerlia* sp. from the Ushyin Khuduk was mentioned without description, illustration and any evidence for its systematic assignment. For this reason, until more information is available, this record should be tentatively considered as Nanhsiungchelyidae indet.

33. Wujing (=Wuching), Nanxiong, Guangdong Province, China.

Geology and age. Nanxiong Formation, Maastrichtian (Lucas 2000).

Material and references. Carapace and skull of *Nanhsiungchelys wuchingensis* (Yeh 1966, text-figs. 1–3, pls. I–IV; 1994, pp. 30–33, fig. 15, pl. I). "Separate carapace and plastron" of Nanhsiungchelyidae indet. (Yeh 1994, p. 33, 34).

34. Yagaan Khovil, Umnegov Aimag (Southern Gobi), Mongolia.

Geology and age. Djadokhta Formation, Campanian (Sukhanov 2000).

Material and references. Incomplete shell of *Hanbogdemys jaganchobili* (as *Bulganemys jaganchobili*; Sukhanov 2000, p. 342, fig. 17.24; Sukhanov and Narmandakh 2006, p. 124).

Remarks. We consider *Bulganemys jaganchobili* as a species of *Hanbogdemys* as it resembles *H. orientalis* in the general outline and scalation of the carapace. For instance, these species share such characters (after Joyce and Norell 2005) as: nuchal notch formed by nuchal and peripheral 1; anterior side of vertebral 1 moderately wide, in contact with marginal 1; vertebral 5 only partially covers suprapygals, in contact with half the length of marginal 11 and does not reach peripheral 10. Besides that, both species have well-developed costiform processes (Sukhanov, pers. comm. 2008), a character unknown in other nanhsiungchelyids (Sukhanov et al. in press). If the suggested arrangement is correct, then *Hanbogdemys* appears to be the most long-lived genus of Nanhsiungchelyidae ranging from the Cenomanian to Campanian.

35. Zamin Khond (=Dzamin Khond), Umnegov Aimag (Southern Gobi), Mongolia.

Geology and age. Djadokhta Formation, Campanian (Sukhanov 2000; Suzuki and Narmandakh 2004).

Material and references. Incomplete shell of *Zangerlia dzaminchondi* (Sukhanov 2000, fig. 17.25, Sukhanov and Narmandakh 2006, pp. 124, 125). One fragmentary remain of Nanhsiungchelyidae indet. (Suzuki and Narmandakh 2004, p. 10).

36. Unknown locality, probably, north-eastern regions of Mongolia.

Geology and age. ?Late Cretaceous.

Material. Isolated shell fragments of *Hanbogdemys* sp. 2, see description in the Systematics section.

37. Unknown locality, North from Dalanzagdad near the road to Ulan Bator, Mongolia.

Geology and age. Unknown.

Material and references. Shell fragment of Nanhsiungchelyidae indet. (as ?*Basilemys* sp.; Sukhanov and Narmandakh 1975, p. 94, with reference to personal communication of L.I. Khosatzkiy) collected by G.G. Martinson.

Remarks. We did not manage to find this material in ZIN PH collection, where most other turtle specimens studied by Khosatzkiy are kept. Most probably this material is lost.

SYSTEMATICS

Family Nanhsiungchelyidae Yeh, 1966

Genus *Hanbogdemys* Sukhanov et Narmandakh, 2006

Hanbogdemys sp. 1

(Fig. 2)

"*Basilemys*" *orientalis*: Nessov 1987, pl. 1, fig. 13.

Material. ZIN PH 12/80, an almost complete nuchal; ZIN PH 50/80, fragments of left peripherals 8+9; ZIN PH 51/80, fragment of the posterior plastral lobe, including parts of left hypoplastron and

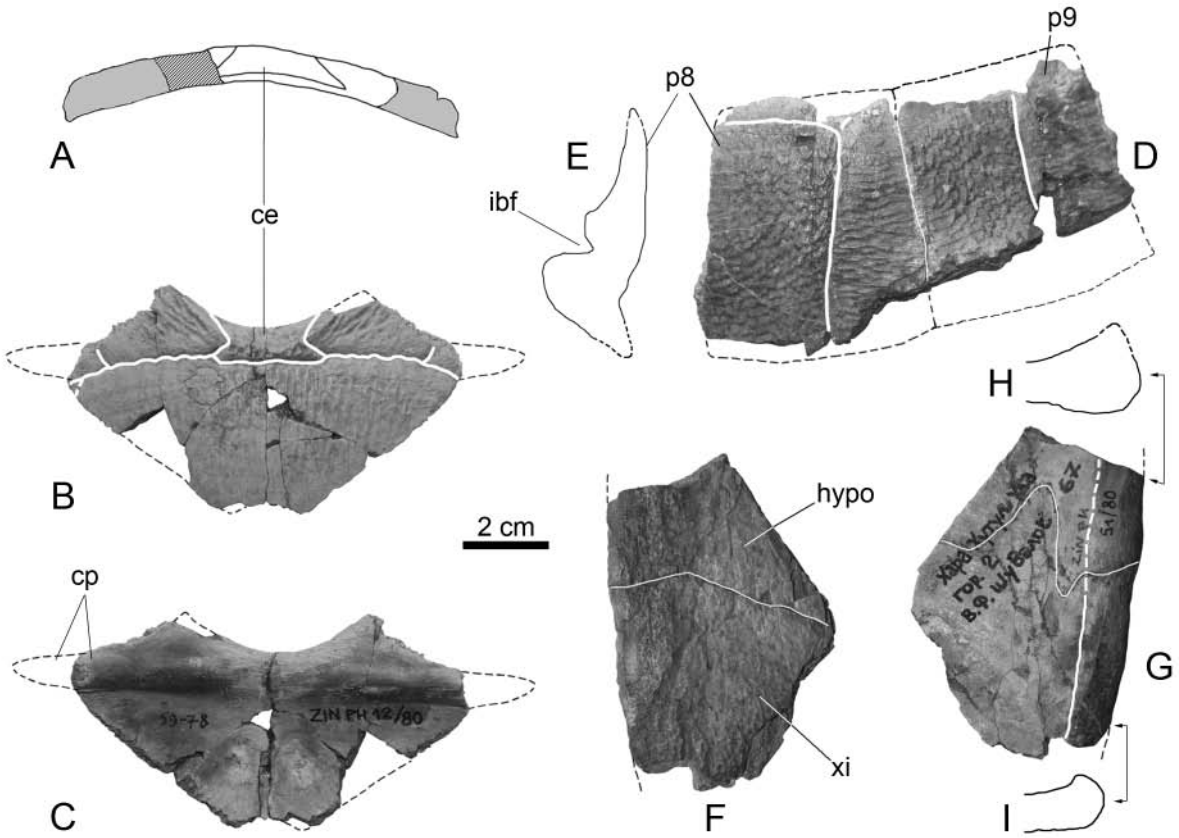

Fig. 2. *Hanbogdemys* sp. 1, shell fragments, Khara Khutul locality, Dornogov Aimag, Mongolia; lower part of the Bainshire Formation, Cenomanian – early Turonian: A–C – ZIN PH 12/80, nuchal: A – anterior view; B – dorsal view; C – ventral view; D, E – ZIN PH 50/80, fragments of left peripherals 8+9: D – dorsal view; E – anterior view of peripheral 8; F–H – ZIN PH 51/80, fragment of the posterior plastral lobe: F – dorsal view; G – ventral view; H – cross section at anterior border; I – cross section at posterior border. A, E, H, I – drawings; B–D, F, G – photograps. In "A", breakages are hatched and sutures are filled with grey. Abbreviations: c – costal; ce – cervical; cp – costiform process; egu – extragular; gu – gular; hypo – hypoplastron; ia – ilial attachment; ibf – ingunal buttress fossa; im – inframarginal; ms – midline sulcus; n – neural; p – peripheral; pe – pectoral; ra – ribhead attachment; sp – suprapygal; v – vertebral; xi – xiphiplastron. Arabic numerals designate element numbers.

xiphiplastron. The specimens were collected in the Khara Khutul, Mongolia, by V.F. Shuvalov in 1967 (50/80 and 51/80) and by G.G. Martinson in 1978 (ZIN PH 12/80).

Description. The nuchal is from a shell with an estimated length of about 45 cm. Its external width is 92 mm; length along the midline – 41 mm. The free edge of the nuchal is 50 mm wide (54% of the nuchal width), which is relatively narrower than in *Hanbogdemys orientalis* (according to the published reconstruction [Sukhanov and Narmandakh 1977, fig. 1], the same ratio is about 30%). It is well emarginated suggesting a deep nuchal notch like in *H. orientalis* and some other nanhsiungchelyids. The anterolateral borders of the nuchal are shorter than the posterolateral ones. The costiform processes are broken off, although their bases are easily traced on the internal surface of the plate as thickenings. It is clear that the costiform processes were as well developed as in *H. orientalis*. The cervical is hourglass-shaped, wider than long (precise shape of the cervical in *H. orientalis* is unknown). Pleurals 1 overlap only lateral corners of the nuchal, suggesting wider vertebral 1 than in *H. orientalis*.

ZIN PH 50/80, the fragment including peripherals 8+9, is from an individual with an estimated shell length of about 40 cm. The peripherals are wider than long. Internally, the peripheral 8 has a deep pit for inguinal buttress. The pleural-marginal sulcus lies on the peripherals very close to the cos-

tal-peripheral suture, like in most other Asian nanhsiungchelyids.

ZIN PH 51/80, the fragment of posterior plastral lobe, belongs to a big individual with an estimated shell length of about 50 cm. This specimen demonstrates lateral part of the hypo-xiphiplastral suture, which is slightly curved on the external surface and strongly Z-shaped internally. As visible from the specimen, the free edge of the posterior lobe is thickened, and plastral scales overlap on its dorsal surface, like in the other Nanhsiungchelyidae, but cross-sections of the lobe are different from those of *Hanbogdemys orientalis* and a new genus and species of the Nanhsiungchelyidae from the Khara Khutul.

All described specimens demonstrate typical nanhsiungchelyid sculpturing and deep scale sulci.

Remarks. The described specimens are assigned to *Hanbogdemys* based on shape of the nuchal, presence of costiform processes, high position of pleural-marginal sulcus and big size. We consider them as *Hanbogdemys* sp., because they differ from *H. orientalis* in several characters of the nuchal and posterior lobe. New materials from the Bainshire Formation are needed to clarify status of the Khara Khutul *Hanbogdemys*.

Hanbogdemys sp. 2
(Fig. 3)

Material. ZIN PH 3/97, anterior fragment of right epiplastron (field No. 210a); ZIN PH 4/97, fragment of right peripheral 8 (field No. 210); ZIN PH 6/97 and 7/97, fragments of isolated left and right costals 8 (probably from one individual; field No. 215). The material was collected by V.N. Chaykovskiy from unknown locality, probably, in north-eastern regions of Mongolia, where he worked as a geologist (Khosatzkiy 1976).

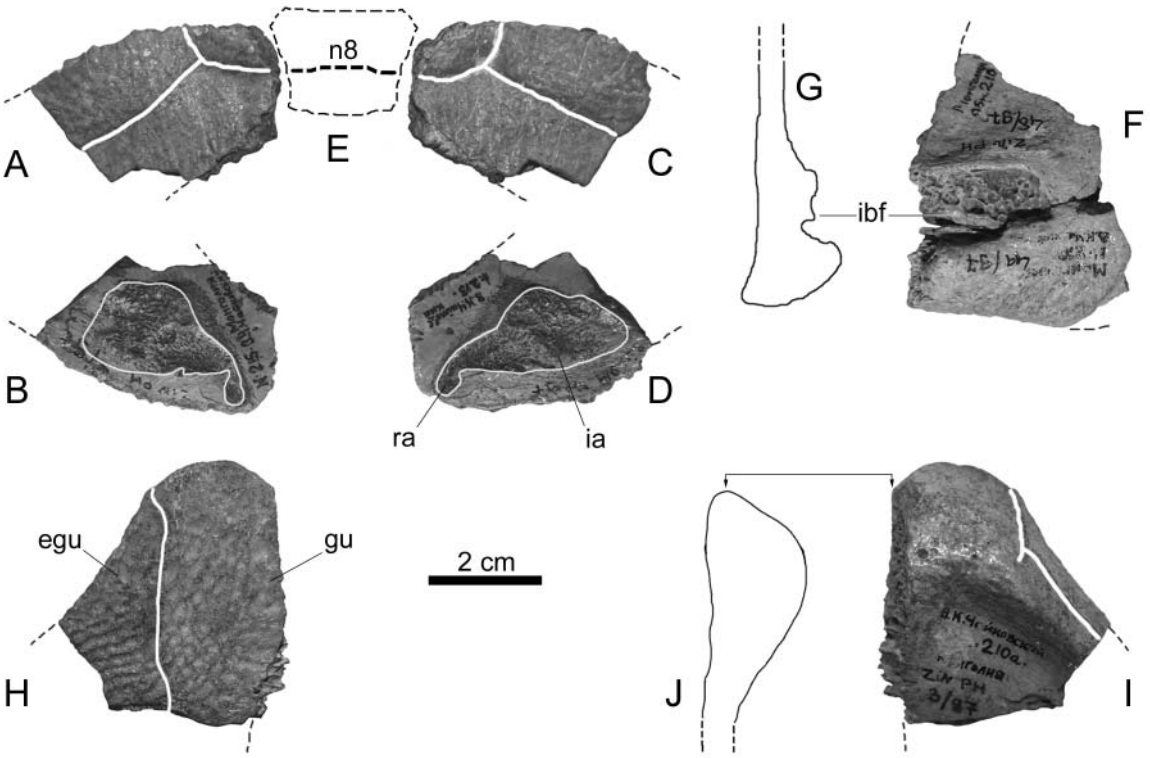

Fig. 3. *Hanbogdemys* sp. 2, shell fragments, Unknown locality, north-eastern regions of Mongolia; ?Late Cretaceous: A, B – ZIN PH 6/97, fragment of left costal 8: A – dorsal view; B – ventral view; C, D – ZIN PH 7/97, fragment of right costal: C – dorsal view; D – ventral view; E – schematic reconstruction of neural 8; F, G – ZIN PH 4/97, fragment of right peripheral 8: F – ventral view; G – cross section at anterior border; H–J – ZIN PH 3/97, anterior fragment of right epiplastron: H – ventral view; I – dorsal view; J – cross section at medial border (symphysis). A–D, F, H, I – photographs; E, G, J – drawings. See Figure 2 for abbreviations.

Description. The costals 8 did not contact at the midline, as evident from their shape, and were separated by neural 8. Internally, they bear big sutural attachments for ribheads and ilial bones. Configuration of scale sulci suggests narrow vertebral 4 and wider vertebral 5, a condition known in many nanhsiungchelyids. Peripheral 8 has morphology similar to those of *Hanbogdemys* sp. 1 (see above). The epiplastron demonstrates a much thickened epiplastral lip with broad dorsal extension of gulars, characteristic of most Nanhsiungchelyidae. Shape of the epiplastron is most similar to those of *Hanbogdemys orientalis* in that it considerably narrows anteriorly, but differs from it in that its anterior edge is rounded, suggesting presence of a small gular notch, not known in this species. Shape of the epiplastral symphysis also differs from those of *H. orientalis* in being less pointed anteriorly. Besides that, extragular scales seem to be larger than in *H. orientalis*. All described specimens demonstrate typical nanhsiungchelyid sculpturing and deep scale sulci.

Remarks. The assignment of the described materials to *Hanbogdemys* is based on similarity in the morphology of the epiplastron.

Nanhsiungchelyidae indet. 1
(Fig. 4)

Dermatemydids, gen. indet. (part.): Gilmore 1931, p. 223.
Basilemys sp.: Sukhanov and Narmandakh 1975, p. 94.

Material. AMNH 6658 and 6659, two partial shells from Bayn Dzak (=Shabarakh Usu) Mongolia, mentioned by Gilmore (1931) as part of his Dermatemydids, gen. indet.

Description. AMNH 6658 is a posterior part of the carapace. Most sutures and sulci of this specimen are impossible to trace. A single almost complete peripheral on the left anterior side of the specimen is relatively narrow (not expanded) and with pleural-marginal sulcus situated in the medial part of the peripheral.

AMNH 6659 is an anterior part of the carapace with the following elements visible: neurals 1–3, complete left costals 1–3 and medial parts of right costals 1–3, fragments of few more posterior costals, parts of left and right peripherals 2 and, probably, also 3. According to our interpretation, the carapace was subjected to the deformation resulted in that its right half is narrower than the left one. Neural 1 is represented by its posterior part bearing short posterolateral sides suggesting that the element was hexagonal short-sided posteriorly. Neural 2 is tetragonal. Neural 3 is hexagonal short-sided anteriorly. Thus, the anterior neurals shows morphology characteristic of adocids and nanhsiungchelyids. Peripheral 2 is longer than wide. Among vertebrals, the posterior part of vertebral 1, complete vertebral 2 and anterior part of vertebral 3 are observable. Vertebral 1 widens anteriorly, although its precise shape and contacts are not clear. Vertebrals 2 and 3 are relatively narrow. The pleural-marginal sulcus is situated in the medial parts of anterior peripherals rather close to the peripheral-costal suture.

Both specimens have a typical nanhsiungchelyid sculpturing and deep scale sulci.

Remarks. Gilmore (1931) put these specimens to Dermatemydids indet., a determination correct at that time, when Dermatemydidae Gray, 1870 was a wastebasket of many primitive cryptodires (see Hay 1908). Sukhanov and Narmandakh (1975) mentioned these materials in their review of *Basilemys* findings in Asia. Our study shows that these materials cannot be determined closer than Nanhsiungchelyidae indet. This attribution is based on type of sculpturing, deep scale sulci, shape of peripherals and position of pleural-marginal sulci on peripherals.

Nanhsiungchelyidae indet. 2
(Fig. 5)

Adocus sp.: Gilmore 1931, p. 222.

Material. AMNH 6676, shell fragments including right peripheral 1, left peripheral 2, right peripheral 8, left peripherals 9 and 11, fragment of left epiplastron and numerous other, mostly undetermined specimens. All materials were collected from the Dohoin Usu in 1925 (Gilmore 1931).

Description. Peripheral 1 is almost triangular-shaped, strongly narrowed medially. Its free edge is rounded implying presence of a small nuchal emargination. The pleural-marginal sulcus is situated in the medial part of the plate. There is a small overlap of vertebral 1 at the border with nuchal. Internally, peripherals 1 demonstrate scale-skin sulcus, which becomes more distant from the free edge posteriorly. No trace of a groove for the costiform process of the nuchal is observable, implying that the process was absent. Peripheral 2 is a subrectangular plate longer than wide. The pleural-marginal sulcus is situated close to its medial border. Internally, at the posterior

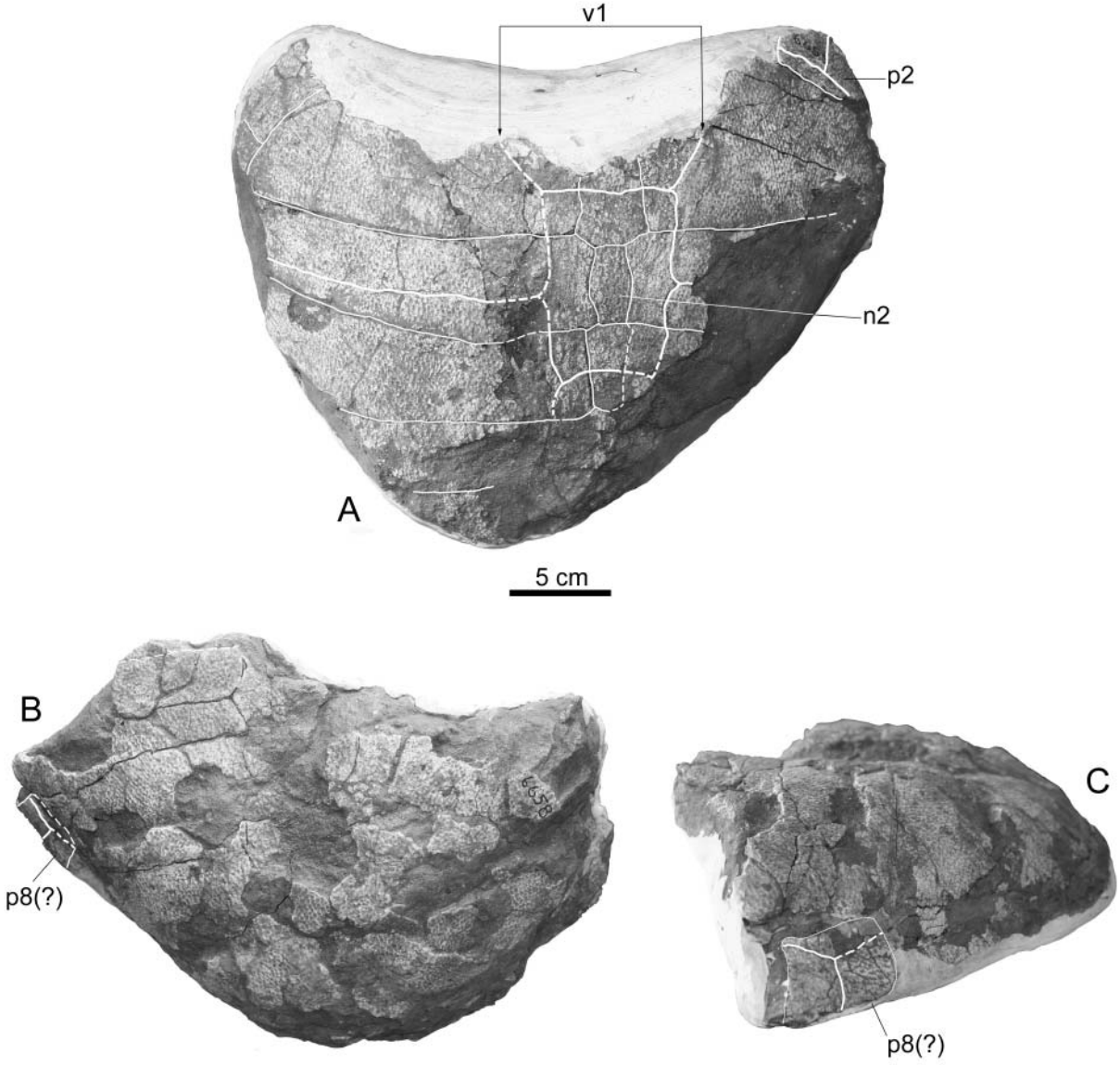

Fig. 4. Nanhsiungchelyidae indet 1., two partial shells, Bayn Dzak, Umnegov Aimag, Mongolia; Djadokhta Formation, Campanian: A – AMNH 6659, anterior part of the carapace in dorsal view; B, C – AMNH 6658, posterior part of the carapace: B – dorsal view; C – left lateral view. Photographs. See Figure 2 for abbreviations.

border, the plate has a pit for the axillary buttress. Peripheral 8 is a trapezoid-shaped plate, wider than long and the free edge is longer than the medial length. The pleural-marginal sulcus coincides with the medial border of the plate. Internally at the anterior border, the plate is thickened and bears a pit for the inguinal buttress. Peripheral 9 is wider than long. The pleural-marginal sulcus is situated near the medial border of the plate. A small part of the interpleural sulcus between pleurals 3 and 4 is visible in the anterior part of the plate. Peripheral 11 is subrectangular, approximately as wide as long. Posteriorly, it has borders for contacts with pygal and suprapygal 2. The pleural-marginal sulcus does not cross the plate and was located higher, on costals and suprapygal 2.

The epiplastron is rounded anteriorly implying presence of a small gular notch. The epiplastral lip is low with broad extension of scales onto the dorsal surface of the epiplastron. Gulars seem to be paired. The

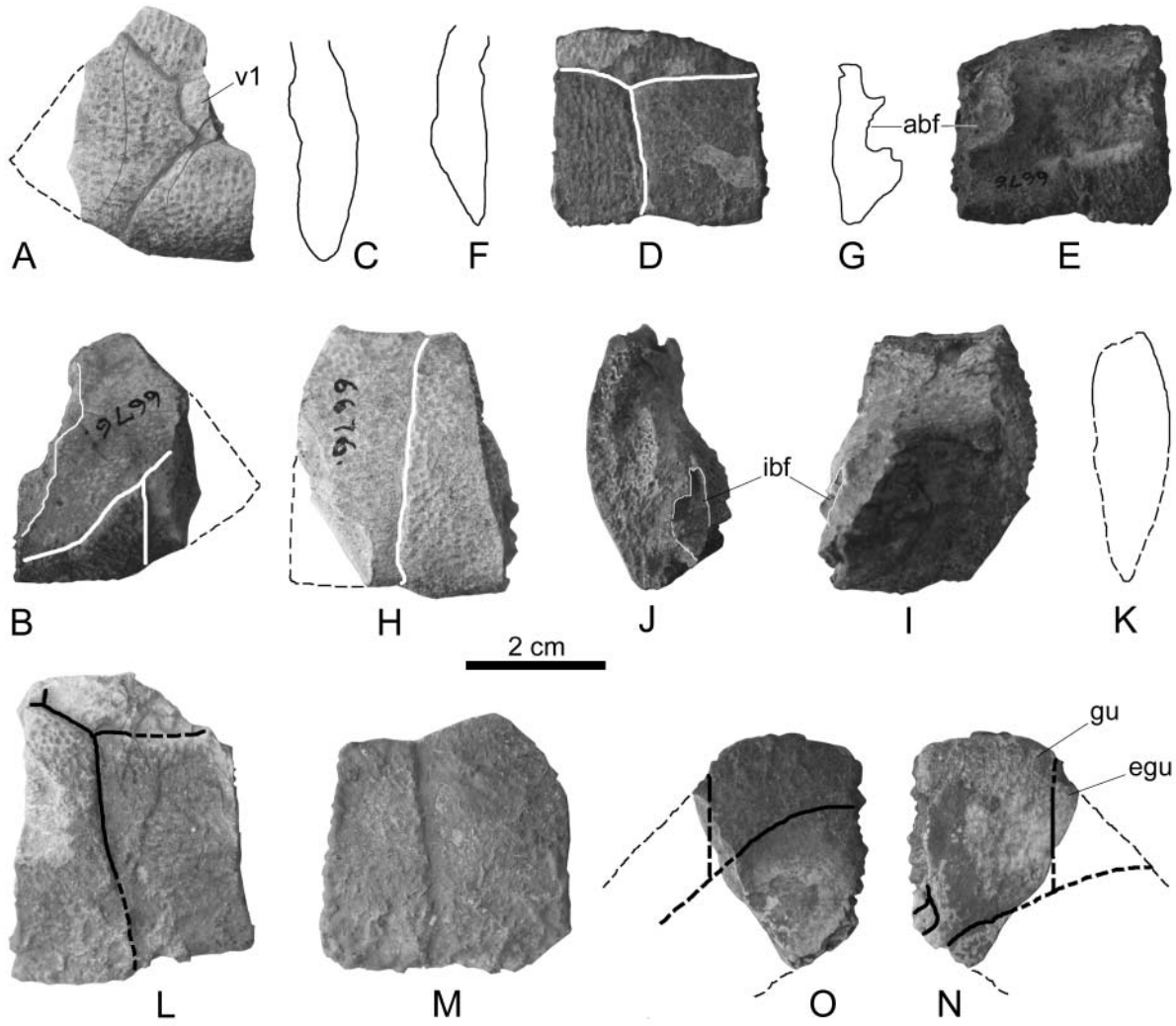

Fig. 5. Nanhsiungchelyidae indet. 2., shell fragments (AMNH 6676), Dohoin Usu, Dundgov Aimag, Mongolia; Dohoin Usu Formation, ?Campanian: A–C – right peripheral 1: A – dorsal view; B – ventral view; C – cross section at anterior border; D–G – left peripheral 2: D – dorsal view; E – ventral view; F – cross section at anterior border; G – cross section at posterior border; H–K – right peripheral 8: H – dorsal view; I – ventral view; J – anterior view; K – cross section at posterior border; L – left peripheral 9 in dorsal view; M – left peripheral 11 in dorsal view; N, O – fragment of left epiplastron: N – ventral view; O – dorsal view. A, B, D, E, H–J, L–O – photographs; C, F, G, K – drawings. See Figure 2 for abbreviations.

extragular is a small triangular scale separated from the midline by contact of the gular and humeral.

All described elements have a typical nanhsiungchelyid sculpturing and deep scale sulci.

Remarks. Gilmore (1931) assigned "a fragmentary turtle specimen" from Shabarakh Usu to *Adocus* sp. based on surface sculpture, which is somewhat similar in adocids and nanhsiungchelyids (see Introduction). Attribution of these materials to the Nanhsiungchelyidae is based on a combination of characters, including sculpturing, deep scale sulci, position of pleural-marginal sulcus on peripherals and overlap of plastral scales onto the dorsal surface of the plastron.

Nanhsiungchelyidae indet. 3
(Fig. 6A–C)

Material. ZIN PH 9/101, fragment of costal; ZIN PH 10–20/101, undetermined shell fragments. The material was collected from the Dzun Bayan, Mongolia, by R. Barsbold in 1968.

Remarks. All fragments have a typical nanhsiungchelyid sculpturing. Besides that, some specimens demonstrate deep scale sulci. In combination, these characters allow reliable attribution of the material to the Nanhsiungchelyidae.

Nanhsiungchelyidae indet. 4
(Fig. 6D, E)

Material. ZIN PH 1/102, an undetermined shell fragment collected in the Erdeni Ula, Mongolia, by G.G. Martinson in 1968.

Remarks. This fragment is assigned to the Nanhsiungchelyidae based on a typical nanhsiungchelyid sculpturing.

Nanhsiungchelyidae indet. 5
(Fig. 6F)

Material. ZIN PH 1–13/103, undetermined shell fragments collected in the Khamaryn Khural, Mongolia, by G.G. Martinson 1971.

Remarks. All specimens have a typical nanhsiungchelyid sculpturing. Besides that, some specimens demonstrate deep scale sulci. In combination, these characters allow reliable attribution of the material to the Nanhsiungchelyidae.

Nanhsiungchelyidae indet. 6
(Fig. 6G, H)

Material. ZIN PH 34/80, fragment of right peripheral 10; numerous undetermined shell fragments in the same collection (ZIN PH 80). The materials were collected in the Khara Khutul, Mongolia, by V.F. Shuvalov in 1967.

Description and remarks. ZIN PH 34/80, fragment of peripheral 10, is from individual with an estimated shell length of about 60 cm. This specimen is peculiar in that the pleural-marginal sulcus is distant from the medial border of the plate in its anterior part and sharply approaches it in its posterior part. Similar morphology of peripheral 10 is known in some *Basilemys* (*B. nobilis*, *B. variolosa*), whereas in *Hanbogdemys orientalis* and most other Asian nanhsiungchelyids the pleural-marginal sulcus is located very close to the costal-peripheral suture. In the new genus and species of Nanhsiungchelyidae from the Khara Khutul (Sukhanov et al. in press) the position of the pleural-marginal sulcus on the posterior peripherals is not known, although this new taxon differs from material described herein by smaller shell size. By these reasons, until more information available, this record should be tentatively considered as Nanhsiungchelyidae indet.

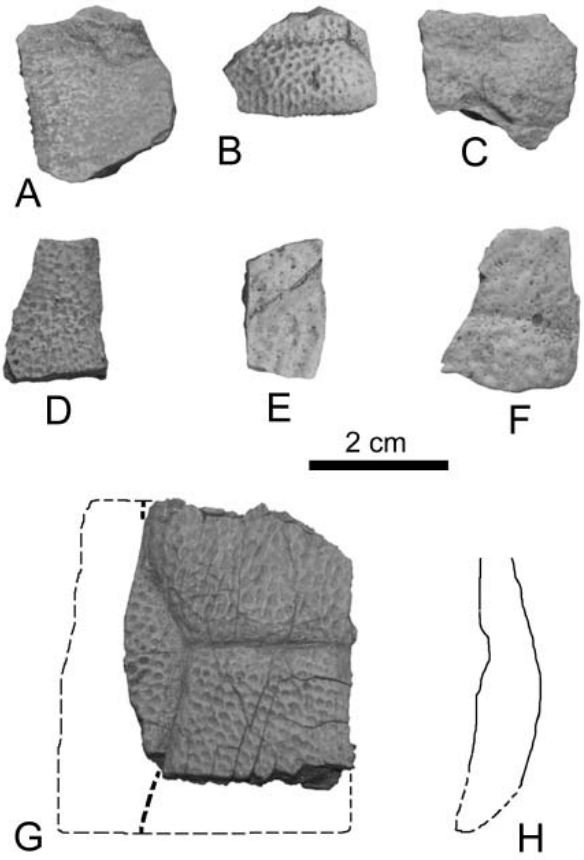

Fig. 6. Nanhsiungchelyidae indet. 3–6, shell fragments: A–C – Nanhsiungchelyidae indet. 3, shell fragments in external view, Dzun Bayan, Dundgov Aimag, Mongolia; Baruunbayan Svita, Aptian–Albian: A – ZIN PH 17/101, undetermined shell fragment; B – ZIN PH 9/101, fragment of even costal; C – ZIN PH 19/101, undetermined shell fragment; D, E – Nanhsiungchelyidae indet 4, undetermined shell fragments in external view, Erdeni Ula, Dundgov Aimag, Mongolia; Khulsangol Svita, Aptian–Albian: D – ZIN PH 1/102; E – ZIN PH 7/102; F – Nanhsiungchelyidae indet. 5, ZIN PH 8/103, undetermined shell fragment in external view, Khamaryn Khural, Dornogov Aimag, Mongolia; Hühteeg Svita, Aptian–Albian; G, H – Nanhsiungchelyidae indet. 6, ZIN PH 34/80, fragment of right peripheral 10, Khara Khutul, Dornogov Aimag, Mongolia; lower part of Bainshire Formation, Cenomanian – early Turonian: G – dorsal view; H – cross section at anterior border. A–G – photographs; H – drawing.

Nanhsiungchelyidae indet. 7
(Fig. 7)

Zangerlia testudinimorpha (part.): Młynarski 1972, p. 86.

Material. ZPAL MgCh/73, an incomplete carapace collected by the Polish-Mongolian Paleontological Expedition in the Khulsan, Mongolia, in 1970.

Description. The specimen is an incomplete carapace with an estimated length of about 40 cm. Only its posterolateral region is observable, including neural 8, suprapygal 1, costals 4–8 on the right side and costal 8 on the left side. Scales are represented by parts of vertebrals 3–5 and right pleurals 3 and 4. Costal 7 is very short antero-posteriorly, probably, due to deformation. Vertebral 5 widens posteriorly like in most nanhsiungchelyids. The surface of the plates is covered with a nanhsiungchelyid sculpturing and bears deep scale sulci.

Remarks. The described specimen is too fragmentary to allow determination below the family level. For this reason we refer it to Nanhsiungchelyidae indet.

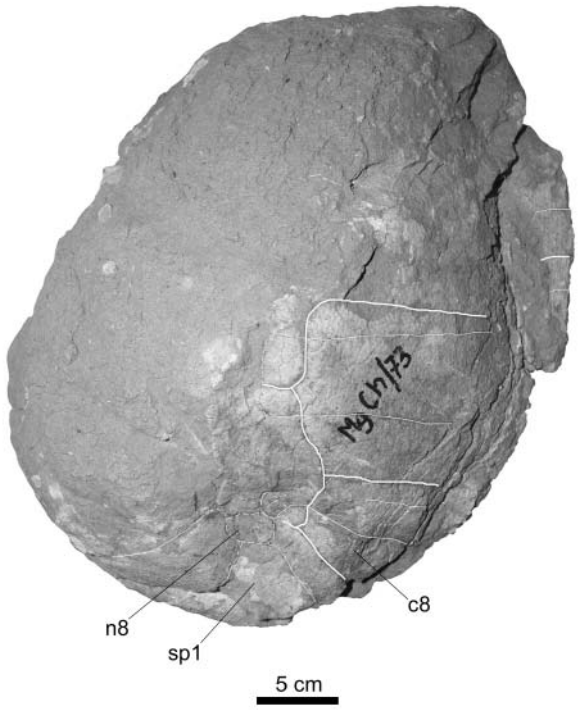

Fig. 7. ZPAL MgCh/73, Nanhsiungchelyidae indet 7, incomplete crapace in dorsal view, Khulsan, Gov-Altai Aimag, Mongolia; Barungoyot Formation, Campanian. Photograph. See Figure 2 for abbreviations.

Nanhsiungchelyidae indet. 8
(Fig. 8)

Material. ZPAL MgCh/130, right peripherals 2+3; ZPAL MgCh/132 and ZPAL MgCh/133, parts of right and left epiplastra, and ZPAL MgCh/112, a partial hypoplastron. All materials were collected by the Polish-Mongolian Paleontological Expedition in the Nemegt, Mongolia, in 1970.

Description. ZPAL MgCh/130 is from an individual with an estimated shell length of about 70 cm. The pleural-marginal sulcus lies in the medial third of peripheral 2. Internally, there is a groove (along the free margin of peripheral 3) and a pit (at the posterior border of peripheral 2) for the axillary buttress.

ZPAL MgCh/132 is an anterior part of the left epiplastron from an individual with an estimated shell length of about 70 cm. The epiplastron has a narrow gular projection similar to those known in *Hanbogdemys orientalis* and some species of *Basilemys* (*B. sinuosa*). The epiplastral lip is much thickened with broad dorsal extension of gulars, characteristic of most Nanhsiungchelyidae. The extragular is in shape of a narrow oblique bar suggesting that it contacted its counterpart at midline. Such morphology is known in *Basilemys praeclara*, *B. sinuosa*, and *Zangerlia neimongolensis*, whereas other nanhsiungchelyids with known morphology of this region have triangular extragulars, which do not meet medially.

ZPAL MgCh/133 is a fragment of the right epiplastron of a smaller individual than ZPAL MgCh/132. Although the epiplastral lip is broken off, this specimen also demonstrates overlap of plastral scales onto the dorsal surface of the epiplastron. On the external surface of the fragment only one sulcus (probably, gular-extragular) is observable.

ZPAL MgCh/112 is a fragment of hypoplastron from an individual with an estimated shell length of about 35 cm. The external surface of the specimen is weathered and no sulci are discernable.

Remarks. The described specimens record presence of a big nanhsiungchelyid (up to 70 cm in the shell length) in the Nemegt. The previous nanhsiungchelyid record from the Nemegt is represented by the relatively small species *Zangerlia testudinimorpha* which is about 25 cm in the shell length. Unfortunately, the fragmentary nature of the remains described above does not allow comparison with this species. For this reason, until more information is available, this record should be tentatively considered as Nanhsiungchelyidae indet.

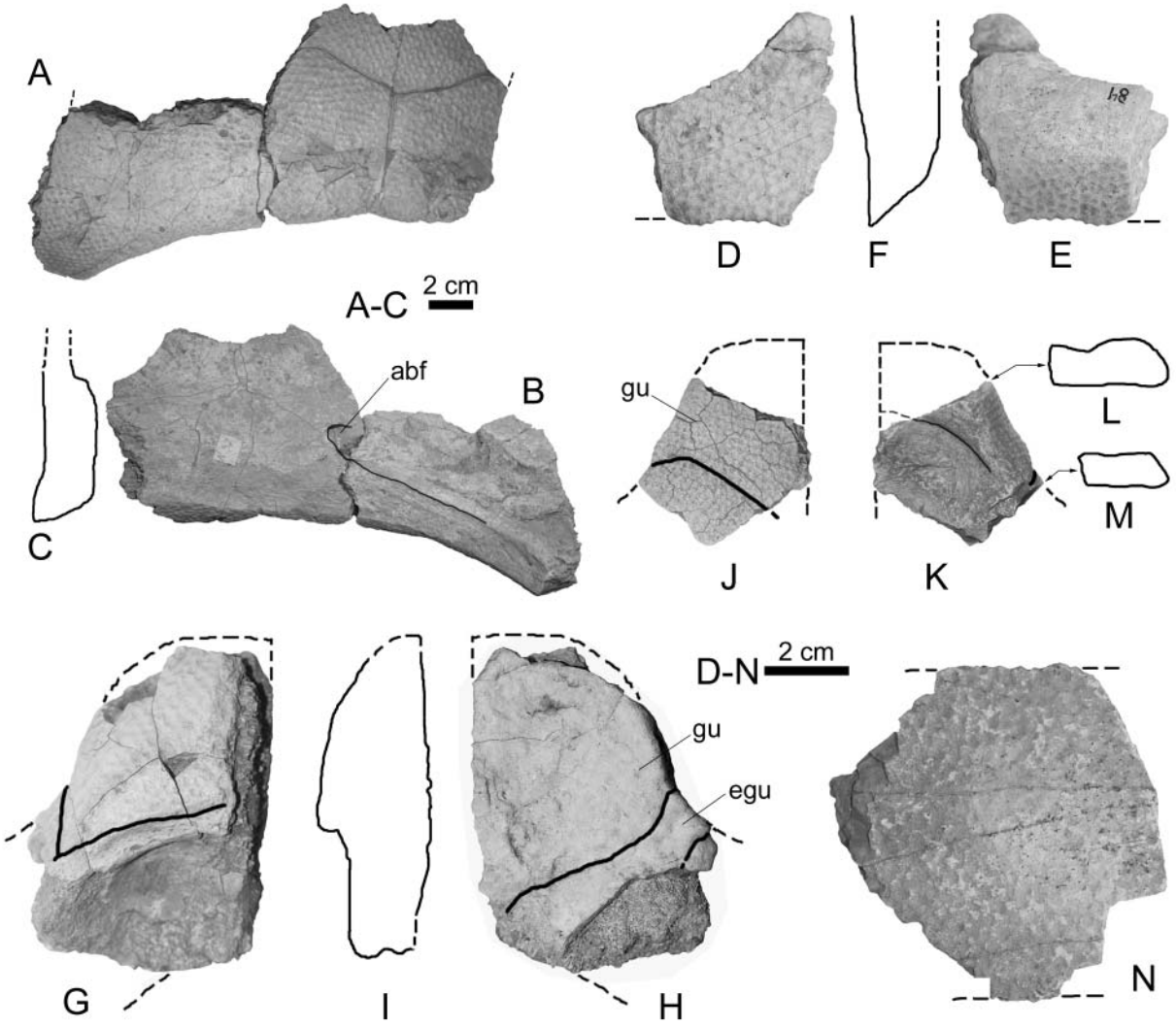

Fig. 8. Nanhsiungchelyidae indet. 8, shell fragments, Nemegt, Gov-Altai Aimag, Mongolia; Barungoyot and/or Nemegt formations, Campanian – Maastrichtian: A–C – ZPAL MgCh/130, right peripherals 2+3: A – dorsal view; B – ventral view; C – cross section at anterior border of peripheral 2; D–F – ZPAL MgCh/84, fragment of posterior peripheral: D – dorsal view; E – ventral view; F – cross section; G–I – ZPAL MgCh/132, fragment of left epiplastron: G – dorsal view; H – ventral view; I – cross section at medial border (symphysis); J–M – ZPAL MgCh/133, fragment of right epiplastron: J – ventral view; K – dorsal view; L, M – cross sections; N – ZPAL MgCh/112, partial hypoplastron in ventral view. A, B, D, E, G, H, J, K, N – photographs; C, F, I, L, M – drawings. See Figure 2 for abbreviations.

Nanhsiungchelyidae indet. 9
(Fig. 9)

Material. ZIN PH 1/100, a partial right hyoplastron, collected by G.G. Martinson in Olgoy Ulan Tsav, Mongolia, in 1968.

Description. The hyoplastron is from an individual with an estimated shell length of about 50 cm. Its lateral and most of the medial border are broken off, however general proportions of the hyoplastron seems to correspond to those of the other nanhsiungchelyids. The axillary notch is wide, and the anterior lobe strongly narrows anteriorly. Scale sulci are deep and well visible. Among scales visible on the specimen are right humeral, pectoral, abdominal, inframarginal 1 and marginals 4 to 6. The pectoral is separated from the corner of the axillary notch by contact of the humeral and inframarginal 1, which is a well known nanhsiungchelyid synapomorphy (Joyce and Norell, 2005). The pectoral seems to be very long medially,

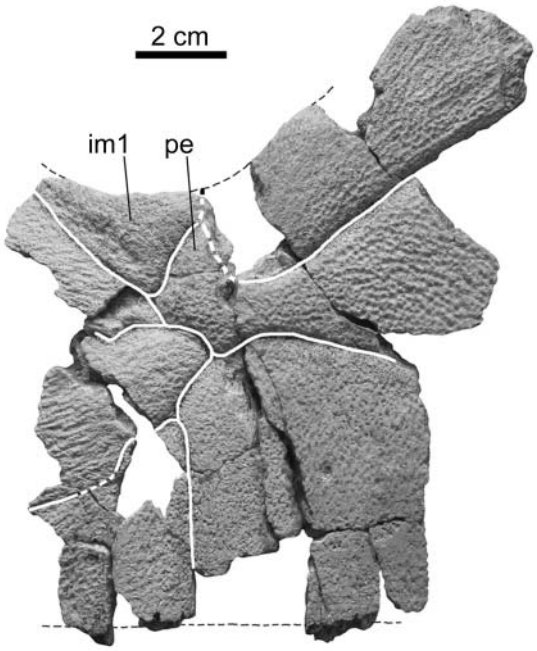

Fig. 9. ZIN PH 1/100, Nanhsiungchelyidae indet. 9, partial right hyoplastron in ventral view, Olgoy Ulan Tsav, Dundgov Aimag, Mongolia; Baruunbayan Svita, Aptian–Albian. Photograph. See Figure 2 for abbreviations.

although its precise medial length is unknown. Laterally it shortens forming a waist and more laterally again becomes longer. Lateral contacts of the pectoral include (from anterior to posterior) inframarginal 1 and marginals 4 and 5. The hyoplastral part of the abdominal laterally contacts marginals 5 and 6. A similar configuration of bridge scales is known in species of *Basilemys* and in *Zangerlia neimongolensis*. In the latter species, the pectoral contacts inframarginal 1 (axillary scale), and marginal 5, whereas marginal 4 may approach the pectoral as a variation (Brinkman and Peng, 1996, fig. 1D). Externally, ZIN PH 1/100 is covered with a typical nanhsiungchelyid sculpturing.

Remarks. The described specimen clearly belong to the Nanhsiungchelyidae based, besides sculpturing and deep scale sulci, on presence of the humeral-inframarginal 1 contact. Unfortunately, the fragmentary nature of the specimen does not allow determination more precise than Nanhsiungchelyidae indet.

Nanhsiungchelyidae indet. 10
(Fig. 10)

Material. ZIN PH 47/87, a fragment of right epiplastron, ZIN PH 48/87, a fragment of left xiphiplastron, and ZIN PH 49/87, a fragments of right xiphiplastron. All specimens were collected in the Khodzhakul (ZIN PH 47/87) and Sheikhdzheili II (ZIN PH 48/87 and 49/87), Uzbekistan, by L.A. Nessov in 1980 and 1982 (ZIN PH 47/87 and 48/87) and by URBAC expedition in 2003 (ZIN PH 49/87).

Description. ZIN PH 47/87 is a medial fragment of right epiplastron from a relatively small individual (estimated shell length – about 25 cm). It has a rounded anterior margin forming a small gular notch. The epiplastral lip is shallow with weak gular extension. The gular overlaps the entoplastron. The condition of the gulars, separated or fused, is unclear. The extragular is triangular and separated from its counterpart by a contact of the gulars and humerals.

ZIN PH 48/87 includes most of the anterior portion of the left xiphiplastron. In the lateral third of its anterior border the xiphiplastron has a big projection entering the corresponding notch of the hypoplastron. The preserved (femoral) part of the lateral border of the xiphiplastron is convex implying that the lateral border was notched at the place of the femoral-anal sulcus. The femoral-anal sulcus is deep and directed anteromedially from the lateral border. Internally, the lateral border of the plate is thickened with clear extension of the plastral scales (femoral) onto the dorsal surface of the xiphiplastron.

ZIN PH 49/87 is a posterior fragment of the right xiphiplastron. Ventrally it bears a loop of the medial plastral sulcus, suggesting that this sulcus was strongly sinuous there, like in most nanhsiungchelyids. Internally, there is a clear extension of the anal scale onto the dorsal surface of the xiphiplastron. The scale-skin sulcus reaches the free edge of the plate at the midline and getting distant from it more anteriorly. Together, ZIN PH 48/87 and 49/87 allow us to reconstruct the complete xiphiplastron of the nanhsiungchelyid from the Khodzhakul Formation (Fig. 10J, K).

The described fragments are covered with the nanhsiungchelyid sculpturing and bear deep scale sulci.

Remarks. The described specimens clearly belong to Nanhsiungchelyidae based on sculpturing, deep scale sulci, and overlap of scales on the dorsal surface of the plastron. Morphology of the epiplastron and xiphiplastron of this nanhsiungchelyid is most similar to the new nanhsiungchelyid taxon from the Khara Khutul, Mongolia (Sukhanov et al. in press). Until more information is available, we consider the Khodzhakul nanhsiungchelyid as Nanhsiungchelyidae indet.

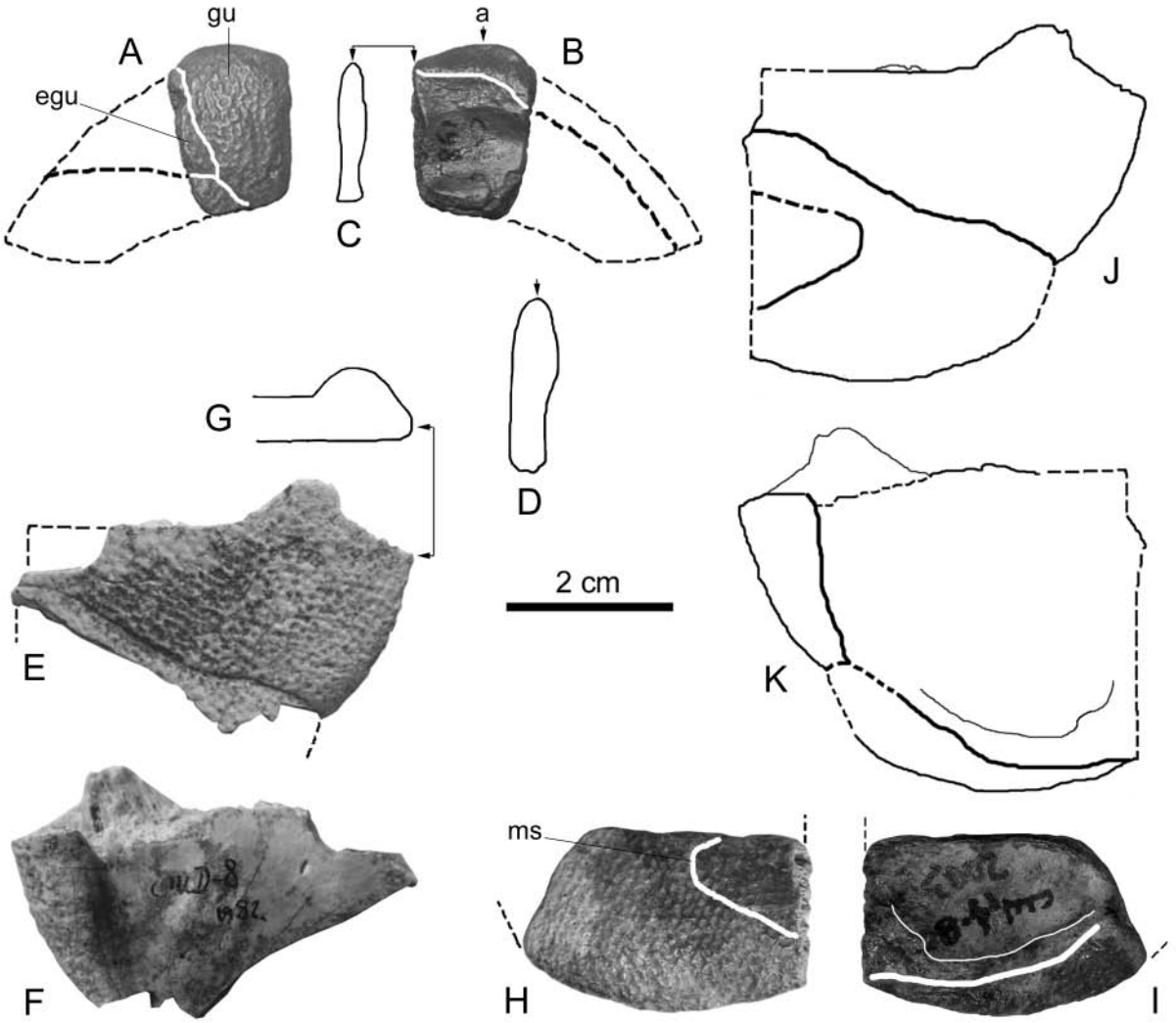

Fig. 10. Nanhsiungchelyidae indet 10, shell fragments, Sultanuvais Randge, Uzbekistan; Khodzhakul Formation, early Cenomanian: A–D – ZIN PH 47/87, fragment of right epiplastron: A – ventral view; B – dorsal view; C – cross section at medial border (symphysis); D – cross section at point "a"; E–G – ZIN PH 48/87, anterior fragment of left xiphiplastron: E – ventral view; F – dorsal view; G – cross section at anterior border; H, I – ZIN PH 49/87, posterior fragment of right xiphiplastron: H – ventral view; I – dorsal view; J, K – reconstruction of left xiphiplastron: J – ventral view; K – dorsal view. A, B, E, F, H, I – photographs; C, D, G, J, K – drawings. See Figure 2 for abbreviations.

DISCUSSION

Our review of all known records of nanhsiungchelyid turtles in Asia includes data from 37 localities (see Table 2). Records from six localities are completely new, whereas records from 31 localities are based on published data (in some cases with addition of new materials and observations). The taxonomic status of the previous records from 19 localities is changed according to modern systematics based on published data, new materials and/or observations, although status of some records need confirmation. New materials (including previously recorded, but undescribed specimens) were described from 12 localities and assigned either to *Hanbogdemys* sp. (1 and 2) or to Nanhsiungchelyidae indet. (1 to 10).

One of the important results of our study includes description of nanhsiungchelyids (Nanhsiungchelyidae indet. 3, 4, 5 and 9) from several Early Cretaceous (Aptian–Albian) localities of Mongolia (Dzun

Bayan, Erdeni Ula, Khamaryn Khural and Olgoy Ulan Tsav). Prior to this study, Early Cretaceous nanhsiungchelyids were reported only from the Barremian or Aptian of Japan (Katsuyama; Hirayama 2002). Nanhsiungchelyids reported from the Albian of Uzbekistan (Khodzhakul I; Nessov 1997, p. 135) should be considered early Cenomanian in age, according to recent data on the age of the Khodzhakul Formation (Averianov and Archibald 2005). In the Systematics section we described new nanhsiungchelyid materials from the Khodzhakul Formation, which allow reliable attribution to this family (see Nanhsiungchelyidae indet. 10).

Reassessment of the published data on Asian nanhsiungchelyids allows us to change taxonomic status of many previous findings from *Basilemys* sp.

Table 2. Numbers of published and new records, taxonomic status changes, descriptions of new material and observations provided by this study.

No.	Locality	Published record	New record	Status change	New material and/ or observations
1	Abdrant Nuru	+			
2	Amagimi Dam of Mifune	+		+	
3	Amtgai	+		+	
4	Bain Shire	+			
5	Bayn Dzak	+		+	+
6	Bayshin Tsav	+			
7	Boro Khamarin	+		+	
8	Chelpyk	+		+	
9	Deng Usu	+		+	
10	Dohoin Usu		+		+
11	Dzun Bayan		+		+
12	Erdeni Ula		+		+
13	Hobetsu-cho	+			
14	Katsuyama	+		+	
15	Khamaryn Khural		+		+
16	Khara Khutul	+		+	+
17	Khermeen Tsav II	+			
18	Khodzhakul I	+		+	+
19	Khodzhakulsay	+		+	
20	Khongil Tsav	+			
21	Khulsan	+		+	+
22	Khuren Tsav	+		+	
23	Nemegt	+		+	+
24	Nuchidaba	+			
25	Olgoy Ulan Tsav		+		+
26	Oriki	+		+	
27	Sheikhdzheili II	+		+	+
28	Shiregin Gashun	+		+	
29	Shixing County	+			
30	Udyn Sayr	+			
31	Ukhaa Tolgod	+			
32	Ushyin Khuduk	+		+	
33	Wujing	+			
34	Yagaan Khovil	+		+	
35	Zamin Khond	+			
36	Unknown locality		+		+
37	Unknown locality	+		+	
Total		31	6	19	12

or *Zangerlia* sp. to Nanhsiungchelyidae indet. Thus, until new information is available, *Basilemys* should be considered as purely North American, whereas *Zangerlia* was probably restricted to the Campanian of Mongolia (Fig. 11). Besides that, we place *Bulganemys jaganchobili* to *Hanbogdemys*, making the latter genus to have the widest temporal distribution (from Cenomanian to Campanian) among nanhsiungchelyids in Asia.

Our analysis of nanhsiungchelyid records in Asia (see Table 3) shows that most of them are from Mongolia (26 localities), Middle Asia and Japan have four localities each, and China has only three localities. The Mongolian record is known in the interval from Aptian–Albian to Maastrichtian, although Maastrichtian record from Mongolia is questionable (see below). Japan has the oldest known record (Barremian or Aptian) and the record interval from the Barremian or Aptian to Santonian. Middle Asia has only early Cenomanian record and China – Maastrichtian and probably Campanian. The geological distribution of records (localities) is as follows: Early Cretaceous – 5; Cenomanian–Santonian – 15, Campanian – 10, Maastrichtian – 4. On the whole, the largest number of records (localities) is from the Campanian (10) and Cenomanian–Santonian (8) of Mongolia. Another interesting observation is that all of the considered localities, except the Khara Khutul, have only a single representative of the Nanhsiungchelyidae. The Khara Khutul locality has at least two nanhsiungchelyids determinable below the family level: *Hanbogdemys* sp. and Nanhsiungchelyidae gen. et sp. nov. (see Sukhanov et al. in press).

All nanhsiungchelyids from the Maastrichtian of Mongolia have been reported from the Nemegt Formation of three localities: Khermeen Tsav II, Khuren Tsav and Nemegt (Młynarski and Narmandach 1972; Shuvalov and Chkhikvadze 1975; Suzuki and Narmandakh 2004). These materials are either very poor or not described and figured or their precise age (formation) is unknown (see "Review of records..."). Besides that, our examination of big collections of turtles from the Nemegt Formation (PIN and ZIN PH), including hundreds of specimens (mostly representatives of the basal testudinoid genus *Mongolemys* Khosatzky et Młynarski, 1971) does not reveal any nanhsiungchelyid fragment. For these reasons, the presence of nanhsiungchelyid in the Maastrichtian (Nemegt Formation) of Mongolia should be considered questionable and in need of confirmation.

To summarize, our study presents a significant contribution to the knowledge about geographic and geologic distribution of the nanhsiungchelyid turtles in Asia. However, in spite of this, the nanhsi-

Table 3. Temporal and geographic distribution of nanhsiungchelyid record in Asia. First number refers to locality and number in parenthesis marks number of nanhsiungchelyid taxa in the locality (see "Review of records..." for names of the localities and data on taxa).

Age	Middle Asia (Uzbekistan)	Mongolia	China	Japan	Total
Maastrichtian		17(1), 22(1)	29(1), 33(1)		4
Campanian		1(1), 5(1), 7(1), 10(1), 21(1), 23(1), 30(1), 31(1), 34(1), 35(1)			10
Santonian		3(1), 4(1), 6(1), 9(1), 16(2), 20(1), 28(1), 32(1)		2(1), 26(1)	15
Coniacian					
Turonian					
Cenomanian	8(1), 18(1), 19(1), 27(1)			13(1)	
Early Cretaceous		11(1), 12(1), 15(1), 25(1),		14(1)	5
Unknown age		36(1), 37(1)	24(1)		3
Total	4	26	3	4	37

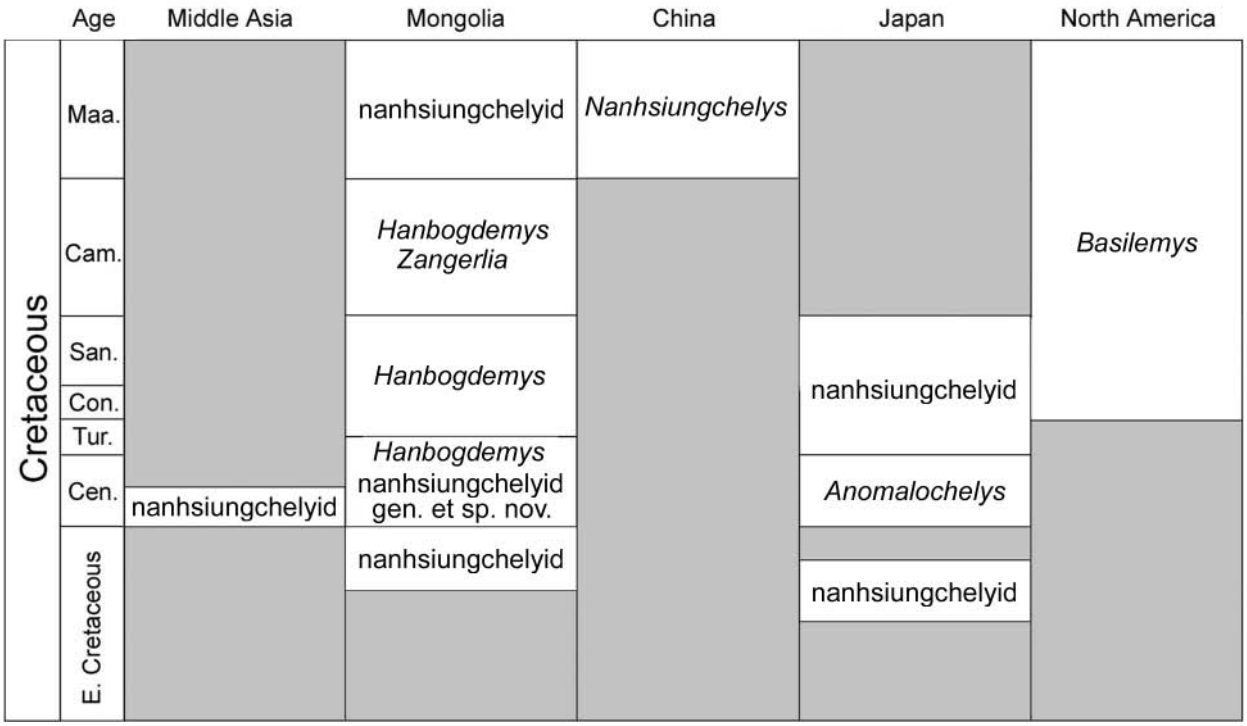

Fig. 11. Temporal and geographic distribution of Nanhsiungchelyidae. Data on *Zangerlia neimongolensis* are not included due to uncertainty of its age. Gaps in record are filled with grey. See text and Figure 1 for details of Asian records. Temporal distribution of nanhsiungchelyids in North America is given according to Hutchison (2000).

ungchelyid record in Asia remains incomplete (Fig. 11). Its most complete part comes from the Cenomanian–Campanian of Mongolia, where and when Asian nanhsiungchelyids reached their peak diversity. These facts emphasize importance of Mongolian record of nanhsiungchelyids for understanding of the diversification and evolution of this group.

ACKNOWLEDGMENTS

The authors thank Natasha Vitek (Yale University, New Haven, USA) for checking the English in the manuscript. IGD thanks Mark A. Norell, and Carl Mehling (AMNH) for access to the turtle collection of AMNH. EVS thanks Magdalena Borsuk-Białynicka (ZPAL) for access to the collections of ZPAL and hospitality. Vladimir B. Tukhanov is thanked for access to the turtle cellection of PIN and comments on some specimens. We thank Drs. Alexander O. Averianov (ZIN) and Walter G. Joyce (Yale Peabody Museum, New Haven, USA) for reviewing the manuscript and useful comments. This study was done under financial support of a grant of the President of the Russian Federation to the Leading Scientific Schools (NSh-119.2008.4), grants of the Russian Foundation for Basic Research (08-05-00557-a and 07-04-91110-АФГИР) and grant of Civilian Research and Development Foundation (RUB1-2860-ST-07).

REFERENCES

Averianov A.O. and Archibald J.D. 2005. Mammals from the Mid-Cretaceous Khodzhakul Formation, Kizylkum Desert, Uzbekistan. *Cretaceous Research*, **26**: 593–608.

Brinkman D. B. 1998. The skull and neck of the Cretaceous turtle *Basilemys* (Trionychoidea, Nanhsiungchelyidae), and the interrelationships of the genus. *Paludicola*, **1**: 150–157.

Brinkman D. and Nicholls E. 1993. New specimen of *Basilemys praeclara* Hay and its bearing on the relationship of the Nanhsiungchelyidae (Reptilia: Testudines). *Journal of Paleontology*, **67**: 1027–1031.

Brinkman D. and Peng J.-H. 1996. A new species of *Zangerlia* (Testudines: Nanhsiungchelyidae) from the Upper Cretaceous redbeds at Bayan Mandahu, Inner Mongolia, and the relationships of the genus. *Canadian Journal of Earth Sciences*, **33**: 526–540.

Chkhikvadze V.M. 1980. On the question of the origin of the soft-shelled turtles. *Bulletin of the Academy of Sciences of the Georgian SSR*, **100**: 501–503. [In Russian]

Danilov I.G. and Parham J.F. 2006. A redescription of '*Plesiochelys*' *tatsuensis* from the Late Jurassic of China,

with comments on the antiquity of the crown clade Cryptodira. *Journal of Vertebrate Paleontology*, **26**: 573–580.

Danilov I.G., Syromyatnikova E.V. and Sukhanov V.B. 2007. Turtles of the genus *Shachemys* from the Upper Cretaceous of Asia. Pp. 59–72 in: A.Yu. Rozanov, A.V. Lopatin and P.Yu. Parkhaev (Eds.). Modern Paleontology: Classical and New Methods – 2007. Paleontological Institute of the Russian Academy of Sciences, Moscow. [In Russian]

Gilmore C.W. 1931. Fossil turtles of Mongolia. *Bulletin of the American Museum of Natural History*, **59**: 213–257.

Hay O.P. 1908. *The Fossil Turtles of North America*. Carnegie Institution of Washington, Washington D.C., 568 pp.

Hirayama R. 1998. Fossil turtles from the Mifune Group (Late Cretaceous) of Kumamoto Prefecture, Western Japan. Pp. 85–99 in: Report of the Research on the Distribution of Important Fossils in Kumamoto Prefecture. Dinosaurs from the Mifune Group, Kumamoto Prefecture, Japan. Mifune Town Education Board. [in Japanese]

Hirayama R. 2002. Preliminary report of the fossil turtles from the Kitadani Formation (Early Cretaceous) of the Tetori Group of Katsuyama, Fukui Prefecture, Central Japan. *Memoir of the Fukui Prefectural Dinosaur Museum*, **1**: 29–40. [In Japanese]

Hirayama R., Sakurai K., Chitoku T., Kawakami G. and Kito N. 2001. *Anomalochelys angulata*, an unusual land turtle of family Nanhsiungchelyidae (Superfamily Trionychoidea; Order Testudines) from the Upper Cretaceous of Hokkaido, North Japan. *Russian Journal of Herpetology*, **8**: 127–138.

Hutchison J.H. 2000. Diversity of Cretaceous turtle faunas of Eastern Asia and their contribution to the turtle faunas of North America. *Paleontological Society of Korea Special Publication*, **4**: 27–38.

Hutchison J.H. and Bramble D.M. 1981. Homology of the plastral scales of the Kinosternidae and related turtles. *Herpetologica*, **37**: 73–85.

Jerzykiewicz T. 2000. Lithostratigraphy and sedimentary settings of the Cretaceous dinosaur beds of Mongolia. Pp. 279–296 in: M.J. Benton, M.A. Shishkin, D.M. Unwin and E.N. Kurochkin (Eds.). The Age of Dinosaurs in Russia and Mongolia. Cambridge University Press, Cambridge.

Jerzykiewicz T. and Russell D.A. 1991. Late Mesozoic stratigraphy and vertebrates of the Gobi Basin. *Cretaceous Research*, **12**: 345–377.

Joyce W.G. 2007. Phylogenetic relationships of Mesozoic turtles. *Bulletin of the Peabody Museum of Natural History*, **48**: 3–102.

Joyce W.G. and Norell M.A. 2005. *Zangerlia ukhaachelys*, new species, a nanhsiungchelyid turtle from the Late Cretaceous of Ukhaa Tolgod, Mongolia. *American Museum Novitates*, **3481**: 1–19.

Kalandadze N.N. and Kurzanov S.M. 1974. The Lower Cretaceous localities of terrestrial vertebrates in Mongolia. *Trudy Sovmestnoy Sovetsko-Mongol'skoy Paleontologicheskoy Ekspeditsii*, **1**: 288–295. [In Russian]

Khosatzkiy L.I. 1976. New representative of trionychids from the Late Cretaceous of Mongolia. *Gerpetologiya. Kubanskiy Gosudarstvennyy Universitet. Nauchnye Trudy*, **218**: 3–19. [In Russian]

Khosatzkiy L.I. 1999. Trionychid turtles of the Cretaceous of Mongolia. *Voprosy Paleontologii*, **11**: 141–149. [In Russian]

Kuznetsov V.V. 1977. Finding of the turtle genus *Basilemys* in the Late Cretaceous of the USSR. Voprosy Gerpetologii. Avtoreferaty dokladov IV Vsesoyuznoy gerpetologicheskoy konferentsii (1-3 February 1977, Leningrad). Nauka, Leningrad: 124–125. [In Russian]

Kuznetsov V.V. and Chkhikvadze V.M. 1987. Late Cretaceous trionychids from the Shakh Shakh locality in Kazakhstan. *Materialy po istorii fauny i flory Kazakhstana*, **9**: 33–39. [In Russian]

Langston W. 1956. The shell of *Basilemys varialosa* (Cope). *Bulletin of the National Museum of Canada*, **142**: 155–165.

Lucas S.G. 2001. *Chinese Fossil Vertebrates*. Columbia University Press, New York, 375 pp.

Meylan P.A. and Gaffney E.S. 1989. The skeletal morphology of the Cretaceous cryptodiran turtle, *Adocus*, and the relationships of the Trionychoidea. *American Museum Novitates*, **2941**: 1–60.

Młynarski M. 1972. *Zangerlia testudinimorpha* n. gen., n. sp., a primitive land tortoise from the Upper Cretaceous of Mongolia. *Palaeontologia Polonica*, **27**: 85–92.

Młynarski M. and Narmandach P. 1972. New turtle remains from the Upper Cretaceous of the Gobi Desert, Mongolia. *Palaeontologia Polonica*, **27**: 95–102.

Narmandakh P. 1985. A new species of *Adocus* from the Late Cretaceous of Mongolia. Paleontologicheskiy Zhurnal, **2**: 85–93. [In Russian]

Nessov L.A. [**Nesov L.A.**] 1981. On the turtle of the family Dermatemydidae from the Cretaceous of Amur River Basin and some other rare findings of remains of ancient turtles of Asia. Pp. 69–73 in: L.Ya. Borkin (Ed.). Herpetological Investigations in Siberia and the Far East. Zoological Institute, Academy of Sciences of the USSR, Leningrad. [In Russian]

Nessov L.A. 1987. On some Mesozoic turtles of the Soviet Union, Mongolia and China, with comments on systematics. *Studia Palaeocheloniologica*, **2**: 87–102.

Nessov L.A. [**Nesov L.A.**] 1997. *Cretaceous nonmarine vertebrates of Northern Eurasia*. St. Petersburg State University, Institute of Earth's Crust, St. Petersburg, 218 pp. [In Russian]

Nessov L.A. [**Nesov L.A.**] **and Krasovskaya T.B.** 1984. Changes in the composition of turtles assemblages of

Late Cretaceous of Middle Asia. *Vestnik Leningradskogo Gosudarstvennogo Universiteta*, **3**: 15–25. [In Russian]

Riggs E.S. 1906. The carapace and plastron of *Basilemys sinuosus*, a new fossil tortoise from the Laramie Beds of Montana. *Field Columbian Museum, Geological Series*, **2**: 249–256.

Shuvalov V.F. 2000. The Cretaceous stratigraphy and palaeobiogeography of Mongolia. Pp. 256–278 in: M.J. Benton, M.A. Shishkin, D.M. Unwin and E.N. Kurochkin (Eds.). The Age of Dinosaurs in Russia and Mongolia. Cambridge University Press, Cambridge.

Shuvalov V.F. and Chkhikvadze V.M. 1975. New data on Late Cretaceous turtles of South Mongolia. *Trudy Sovmestnoy Sovetsko-Mongol'skoy Paleontologicheskoy Ekspeditsii*, **2**: 214–229. [In Russian]

Shuvalov V.F. and Chkhikvadze V.M. 1979. On stratigraphical and systematical position of some freshwater turtles from new Cretaceous localities in Mongolia. *Trudy Sovmestnoy Sovetsko-Mongol'skoy Paleontologicheskoy Ekspeditsii*, **8**: 58–76. [In Russian]

Sukhanov V.B. 2000. Mesozoic turtles of Middle and Central Asia. Pp. 309–367 in: M.J. Benton, M.A. Shishkin, D.M. Unwin and E.N. Kurochkin (Eds.). The Age of Dinosaurs in Russia and Mongolia. Cambridge University Press, Cambridge.

Sukhanov V.B., Danilov I.G. and Syromyatnikova E.V. In press. The description and phylogenetic position of a new nanhsiungchelyid turtle from the Late Cretaceous of Mongolia. *Acta Palaeontologica Polonica*.

Sukhanov V.B. and Narmandakh P. 1975. Turtles of the *Basilemys* group (Chelonia, Dermatemydidae) in Asia. *Trudy Sovmestnoy Sovetsko-Mongol'skoy Paleontologicheskoy Ekspeditsii*, **2**: 94–101. [in Russian]

Sukhanov V.B. and Narmandakh P. 1977. The shell and limbs of *Basilemys orientalis* (Chelonia, Dermatemyidae): a contribution to the morphology and evolution of the genus. *Trudy Sovmestnoy Sovetsko-Mongol'skoy Paleontologicheskoy Ekspeditsii*, **4**: 57–79. [In Russian]

Sukhanov V.B. and Narmandakh P. 2006. New taxa of Mesozoic turtles from Mongolia. Pp. 119–127 in: I.G. Danilov and J.F. Parham (Eds.), Fossil Turtle Research, Vol. 1. Zoological Institute of the Russian Academy of Sciences, St. Petersburg.

Suzuki Sh. and Narmandakh P. 2004. Change of the Cretaceous turtle faunas in Mongolia. *Hayashibara Museum of Natural Sciences Research Bulletin*, **2**: 7–14.

Syromyatnikova E.V. and Danilov I.G. 2008. Distribution of fossil turtles of the families Adocidae and Nanhsiungchelyidae in Asia. Otchetnaya nauchnaya sessiya po itogam rabot 2007 g (8–10 April 2008, St. Petersburg). Tezisy dokladov. Zoological Institute of the Russian Academy of Sciences, St. Petersburg: 47–48. [In Russian]

Tokunaga S. and Shimizu S. 1926. The Cretaceous Formation of Futaba in Iwaki and Its Fossils. *Journal of the Faculty of Science, University of Tokyo (Section 2),* **1**: 181–212.

Trofimov B.A. and Chudinov P.K. 1970. New data about localities of vertebrates of Mongolia. Pp. 152–156 in: V.B. Sukhanov (Ed.). *Materialy po evolutsii nazemnykh pozvonochnykh*. Nauka, Moscow. [In Russian]

Weishampel D.B., Barrett P.M., Coria R.A., Le Loeuff J., Xu. X., Zhao X., Sahni A., Gomani E.M.P. and Noto C.R. 2004. Dinosaur distribution and biology. Pp. 517–606 in : D.B. Weishampel, P. Dodson and H. Osmólska (Eds.). The Dinosauria. University of California Press, Berkeley, Los Angeles, London.

Yeh H.-K. 1966. A new Cretaceous turtle of Nanhsiung, Northern Kwangtung. *Vertebrata PalAsiatica*, **10**: 191–200.

Yeh H.-K. 1994. *Fossil and Recent Turtles of China*. Science Press, Beijing, 112 pp.

Zangerl R. 1969. The turtle shell. Pp. 311–339 in: C. Gans, A.d.A. Bellairs and T.S. Parsons (Eds.). Biology of Reptilia, Vol. 1, Morphology A. Academic Press, New York.

Submitted August 15, 2008; accepted August 27, 2008