Taxonomic reassessment of the Pliocene pond turtle *Melanochely mossoczyi wetterauensis* from the Wetterau brown coal mine in Hesse, Germany

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Abstract

This article provides an extensive description of *Melanochely mossoczyi wetterauensis* based on a re-examination of the holotype specimen that overviews the taxonomic characteristics of late Pliocene turtle remains discovered from the Wetterau-Wolfersheim lignite deposit in Hesse, Germany. The original material was taken from the former "Natural Science Collection" in Meiningen (1950-1960) as an example of exchange material and is currently preserved in the "Natural History Museum" Schleußingen, Thuringia, Germany, as the holotype "MSB IB k 314". This fossil has previously been scientifically described as a genus *Geoemyda* taxa and is reviewed here again for reexamination. This taxon was found to be closely related to the European taxon *Melanochely mossoczyi* (formerly *Geoemyda mossoczyi*) and was renamed here after taxonomic reassessments.
Keywords: Germany, *Melanochely*, Pliocene, Taxonomic reassessment

Introduction

The evolutionary origins of turtles are heavily debated, not just in terms of position in the amniote phylogeny but in how each turtle clade is related to each other (Karl et al., 2021). Turtles are among the most commonly fossilized organisms that are useful as paleo-biogeographical indicators, as their skeletons include shell elements that are durable and amenable to fossilization and allow strong inferences about their phylogenetic relationships. Detailed paleo-biogeographic patterns can be developed by comparing fossils of different ages and from various localities (Takahashi et al., 2008). Considering this advantage, the authors re-examined the taxonomic status and phylogenetic similarities of turtle fossils from the Wetterau lignite coal mine in Germany during the late Pliocene (Figs. 1a and 1b). The original material was taken from the former "Natural Science Collection" in Meiningen (1950-1960) as an example of exchange material and is currently preserved in the "Natural History Museum" Schleußingen, Thuringia, Germany, as the holotype "MSB IB k 314" by making a detailed

comparisons Karl (1983) named it *Geoemyda mossoczyi.* Here, the authors briefly review the fossil remains of this turtle and discuss its taxonomic status and its paleo-biogeographic implications, however, due to the paucity of appropriate comparisons most of the taxonomic status and phylogenetic affinities of most of the fossils remain are uncertain (Takahashi et al., 2007; 2008).

Wölfersheim is located in the former Wetterau lignite mining area operated by Preuäische Electricity AG from 1913 to 1991. From 1962 onwards, coal for the power plant was mined exclusively from open pits. The fossil was first scientifically described as a member of the genus *Geoemyda/Melanochelys* by Karl (1983) and is re-studied here. Based on the re-examination of the holotype specimen, we present a general description and diagnosis of *Geoemyda.* Phylogenetic analysis concluded that this taxon is a member of the family Geoemydidae (formerly Bataguridae), which includes shallow-water turtles. Geoemydidae is one of the largest and most diverse families of the order Chelonia, with approximately 70 species. This family includes Eurasian turtles and Neotropical turtles. The authors also provide new descriptions of the paleoecology and biogeography of this group, including extinct species and subspecies. These are now considered separate and divided into the genera *Heosemys, Leucocephalon, Melanochelys, Siebenrockiella/Panayanemys*, and *Vijayachelys.* The genus *Geoemyda/Melanochelys* once received many species and disappeared as the "Catchall taxon" (Wermuth & Mertens, 1961; Takahashi et al., 2007; 2008), but recent taxonomic and phylogenetic studies have reached consensus on this genus for two surviving species (*Geoemyda japonica* and *Geoemyda spengleri*), all other species were extinct (TTWG (2021). Thus, *Melanochely mossoczyi wetterauensis* described here is the first extinct species of the Genus from Germany in the strict sense.

1. Ryukyu black-breasted leaf turtle, *Geoemyda japonica,* (Fan 1931)
2. Black-breasted leaf turtle, *Geoemyda spengleri* (Gmelin, 1789). All other species of this genus are considered as extinct;
3. *Geoemyda amamiensis (*Takahashi et al., 2007), Amami Leaf Turtle; This species was probably terrestrial and is most closely related to modern *Geoemyda japonica,* a terrestrial species that occurs in the Ryukyu Archipelago (TEWG, 2015).
4. Another extinct species is *Geoemyda eureia* (Wegner), discovered in Poland.
5. *Geoemyda* (*Geoliemys*) Matsumoto 1929:
6. *Geoemyda headonensis* Hooley 1905,
7. *Geoemyda malustensis* Macarovici and Vanca 1960,
8. *Geoemyda mossoczyi* Młynarski 1964,

9. *Geoemyda pidoplickai* Khosatzky 1946,
10. *Geoemyda ptychogastroides* Hummel 1935 (Synonym of *Geiselemys* Khosatzky & Młynarski 1966, 1976),
11. *Geoemyda striata* Deraniyagala 1969.

Figure 1a. Schematic map of Central Europe with the extent of the Hessian brown coal mining area.

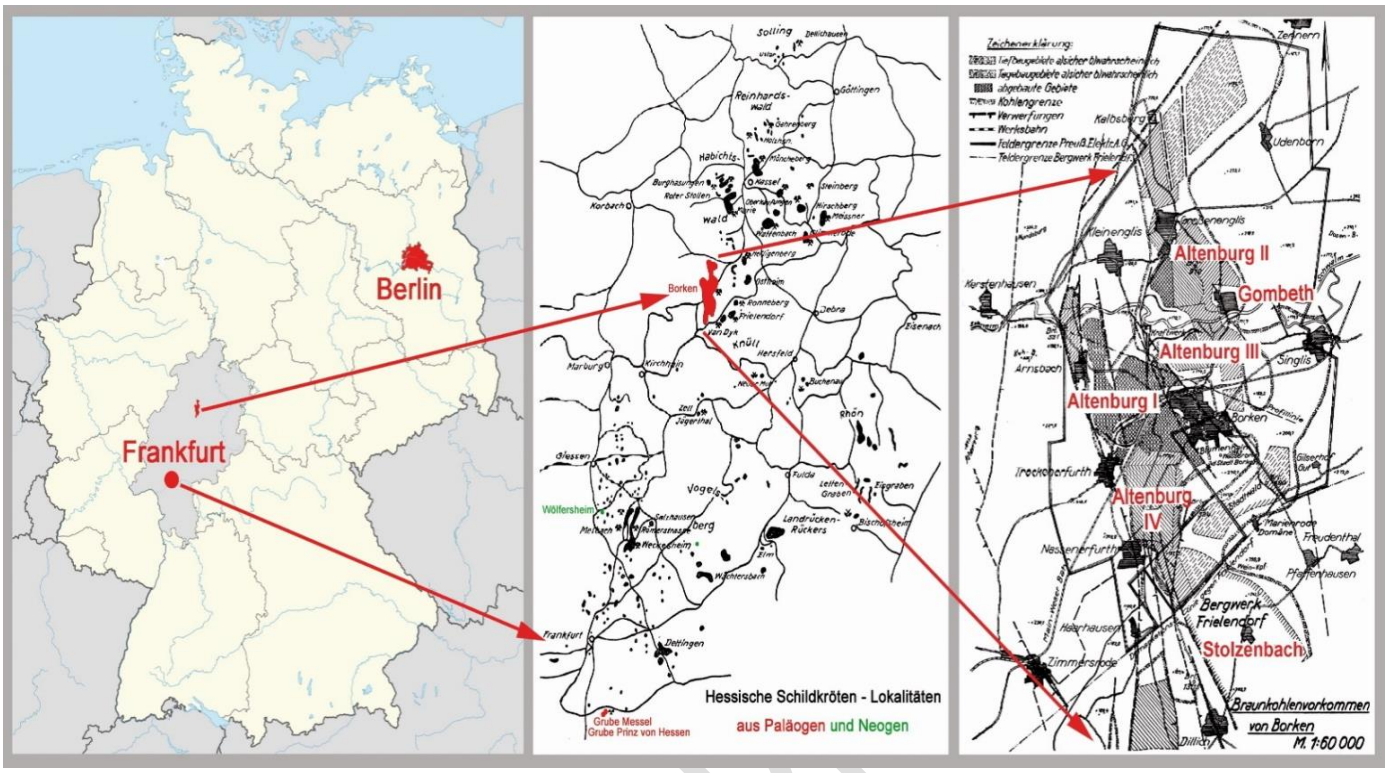

Figure 1b. 1 = Location of the state of Hesse in Germany and position of Frankfurt am Main.

2 = Detail of the area of North Hesse and the former lignite deposits about other turtle localities, red = Paleogene (Messel and 'Prinz von Hessen' mines and green = Neogene (Wölfersheim, Wetterau lignite mining area).

3 = Brown coal deposits from Borken with the turtle locations Altenburg IV and Gombeth. 1 = according to the map "NordNordWest, License: Creative Commons by-a-3.0 de", 2 and 3 according to Steckhan (1952). The discovery of the Neogene turtle material from Wölfersheim is in the economic context of the Paleogene Lower Hesse brown coal mining area around Borken.

Material and methods

The shell's terminology follows Zangerl (1969). The turtle's fossils described in this article were obtained from Pliocene terrapin remains from the Wolfersheim lignite deposit in Wetterau, Hesse, Germany. This study was conducted on turtles distributed in the region. Wölfersheim is located in the former Wetterau lignite mining district, operated by Preuäische Electricity AG from 1913 to 1991. In 1962, coal for the power plant was extracted only from open pits. The original material came to the former Natural Science Collections in Meiningen in the 1950s and 1960s by Johannes Friedemann Schaarschmidt (1934-2005) as an exchange sample and is now in the collection of the Museum of Natural History Schleußingen, Thuringia, Germany. Karl (1983) first scientifically described the record as a member of the genus *Geoemyda* and is reviewed here again. Here, the fossils are prefixed by the acronym B,

followed by a collection number. These comprise the isolated elements collected by screen-washing or surface prospecting. All material was photographed using a Nikon D 90 camera and anatomical orientation techniques were used in this article.

Terminology on the shell of a pond turtle (Fig. 2, 5-6; Plate 1-2)

The terminology of the carapace of a turtle is shown in the individual figures according to Karl & Paust (2014). The following corresponds to Carapace plates (bones): nuchal = nu, neurals = n I to n VIII, pleurals = pl I to VIII, peripheralals = pe I to pe XI, metaneurals = mn I to II, pygal = pyg. Carapace shields (horn): cervical = ce, centrals = c 1 to c 5, laterals = l 1 to l4, caudal = ca. Plastron plates (bones): epiplastrals = epi, entoplastron = ento, hyoplastrals = hyo, hypoplastrals = hypo, xiphiplastrals = xiphi. Plastron shields (horn): Gulars = gu, Humerals = hu, Pectorals = pec, Abdominals = ab, Femorals = fe, Anals = an.

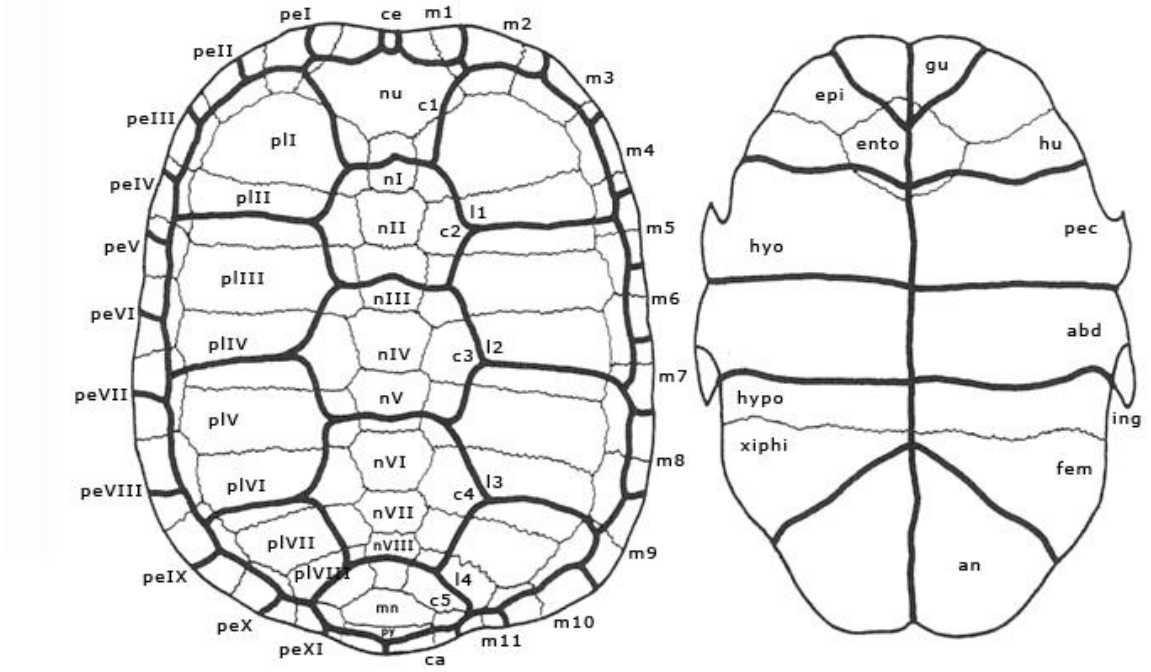

Figure 2. Terminology of the shell of a pond turtle.

Anatomical terms in the text follow Zangerl (1969) and are abbreviated in the figures as:

Ab = abdominal scute, An = anal scute, Ce = cervical scute, co = costal bone, ento = entoplastron

epi = epiplastron, Fe = femoral scute, fo = fontanelle, Gu = gular scute, Hum = humeral scute

hyo = hyoplastron, hypo = hypoplastron, lg = inguinal scute, Ma = marginal scute, mdf = musk duct foramina

ne = neural bone, nu = nuchal bone, Pe = pectoral scute, per = peripheral bone, Pl = pleural scute

py = pygal bone, spy = supra-pygal bone, Ve = vertebral scute, xi = xiphiplastron.

Systematic palaeontology (Fig. 3)

Geoemydidae Theobald 1868

Geoemydinae Theobald 1868

Melanochelys Gray, 1869 (sensu Danilov et al., 2017)

***Melanochelys mossoczyi* (Młynarski 1964)**

(Late Miocene to Early Pleistocene) Mossoczy's Pond Turtle.

Synonyms: *Geoemyda mossoczyi* Młynarski 1964: 335 [Pliocene to Pleistocene, Poland]; *Geoemyda* (*Heosemys*) *mossoczyi*, *Sakya mossoczyi*, *Clemmydopsis mossoczyi*, *Melanochelys mossoczyi*, *Geoemyda* (*Heosemys*) *boristhenica* Tarashchuk 1971: 56 [Middle-Upper Pliocene, Ukraine]; *Geoemyda* (*Heosemys*) *mossoczyi wetterauensis* Karl 1983: 375, *Melanochelys mossoczyi wetterauensis* (Karl 1983 in part.) [Upper Pliocene, Wetterau, Hesse, Germany]. According to TEWG (2015), *Geoemyda m. wetterauensis* is also listed under *Melanochelys mossoczyi*.

Type material: NWSM[i] IE k 313; Fragmentary remains of an approximately 8 cm long animal consisting of an entoplastron (plate 2, figure 1), neural V (plate 2, figure 2), hyoplastron fragment (sin.) (plate 2, figure 12-12a), a peripheral (frag.) from the caudal area (plate 2, figure 3), eight various pleural fragments (plate 2, figure 4-11) and two plastron fragments (indet.) (plate 2, figure 13-14) Karl (1983).

Further material: NWSM IE k 314 (plate 3); fragmentary remains of an approximately 15 cm long animal including a fragmentary peripheral. an epiplastron fragment, an incomplete hyoplastron (dex.) with the attachment of the axillary support, a fragment of a hyo- or hypoplastron from the area of the hyo-hypoplastral suture as well as two further plastron fragments from the edge area and two humerus or femur fragments (see plate 3), Karl (1983).

Geographical and stratigraphic distribution: Wölfersheim, Wetterau, Hesse. Upper Pliocene, Piacenzian MN 16: Layer of the Pliocene lignite seam from a level lying between the Montpellier-Roussillon faunas of Val d'Arno, Seneze, Pardines, Roccaneyra, and Tegelen (Tobien 1952; Karl 1983).

Type localities: Poland, Moldavia, Russia, Slovakia, Ukraine, Germany

Size: CL ca. 20 cm

Synonyms: *Geoemyda mossoczyi* † Młynarski 1964:335 [Pliocene to Lower Pleistocene, Poland)], *Geoemyda (Heosemys) mossoczyi, Sakya mossoczyi, Clemmydopsis mossoczyi, Melanochelys mossoczyi, Geoemyda (Heosemys) boristhenica †* Tarashchuk, 1971:56 [Middle to Late Pliocene, Ukraine]

Geoemyda (Heosemys) mossoczyi wetterauensis † Karl 1983:375 [Late Pliocene, Wetterau, Hesse, Germany], *Melanochelys mossoczyi wetterauensis*

Comments and referred materials: Lapparent de Broin (2001) indicated that this taxon from the Plio-Pleistocene boundary might be referred to either *Sakya* Bogachev 1960 or *Clemmydopsis* Boda 1927. It was referred to *as Melanochelys* by Chkhikvadze (1989) and Danilov et al. (2012, 2013). Generic placement uncertain, sometimes referred to as "*Melanochelys*". The Late Pliocene taxa *Geoemyda boristhenica* and *Geoemyda wetterauensis* may or may not be distinct, but are tentatively listed for now as synonyms under *M. mossoczyi* (TEWG, 2015).

A related referred species of Sub-Family Geoemydinae Theobald 1868, *Melanochelys trijuga,* Gray, 1869: (Fig. 4)

Type species: *Emys trijuga* Schweigger 1812 (Schweigger, 1812).

Holotype: According to Iverson (1992, 2022) in the MNHN, without further information.

Diagnosis: See Das (1991, 1998)

Further species: *Melanochelys etulensis* Khosatzky & Redkozubov 1986 (Lower Pliocene-Lower Pleistocene, Moldavia), *Melanochelys pidoplickoi* (Khosatzky, 1946) (Lower Pliocene-Lower Pleistocene of Ukraine, Moldova and Russia), *Melanochelys sinhaleyus* Deraniyagala 1953 (Late Pleistocene, Sri Lanka), *Melanochelys tricarinata* (syn. *Nicoria tricarinata* Lydekker, 1889, *Nicoria tricarinata sivalensis* Lydekker 1889). Yanenko & Kovalchuk (2023) describes shell remains of *Melanochelys moldavica* Chkhikvadze, 1983 with rodent gnaw marks on the carapace surface.

Description

Geoemyda is now considered unique and is classified into the genera, *Heosemys, Leucocephalon, Melanochelys, Siebenrockiella / Panayanemys,* and *Vijayachelys,* this contains two living species: Ryukyu black-breasted leaf turtle, *G. japonica,* and Black-breasted leaf turtle, *G. spengleri* (TTWG 2021), While these fossils are found in East and Southeast Asia, while most of the fossil remains from extinct species are discovered from Europe. These fossil recorded species are Genus *Geoemyda (Geoliemys*) Matsumoto 1929: *Geoemyda amanuensis* Takahashi et al. 2008, *Geoemyda eureia* Wegner 1913, *Geoemyda headonensis* Hooley 1905, *Geoemyda malustensis* Macarovici and Vanca 1960, *Geoemyda mossoczyi* Młynarski 1964, *Geoemyda pidoplickai* Khosatzky 1946, *Geoemyda ptychogastroides* Hummel 1935 (synonym of *Geiselemys* Khosatzky & Młynarski 1966, 1976), and *Geoemyda striata* Deraniyagala 1969. Entoplastron has the outline of a rhombus, somewhat blunted in the frontal area and rounded in the caudal region, humero-pectoral suture divides the entoplastron exactly in the middle, middle

suture and the ends of the gular sutures that converge at it are present on the entoplastron; Neural III or V divided into almost equal halves by horizontal suture of the centralia, the shape of this neural typical geoemydal. without signs of keel formation or sculpting; Inguinal and axillary supports weakly developed, sculpting on the plastron concentric but very delicately developed, fine-grained, areoles on the plastron form characteristic figures, lateral caudal peripherals slightly protruding, comma-shaped in cross-section, gular ridges strongly developed, caudal plastral part mobile (Karl 1983).

Remarks: The Mossoczy´s forest turtle is known from the Upper Miocene to the Lower Pleistocene from Poland, Moldova, Russia, Slovakia, Ukraine, and Germany. Bachmayer & Młynarski (1984) believe, contrary to Chkhikvadze (1973, 1983), that all these fossil species do not belong to Melanochelys Gray, 1869. In their opinion, these turtles did not occur in the European Tertiary. The turtles discussed include some specific characteristics of the two subgenera *Geoemyda* and *Melanochelys*, but not of *Heosemys*, as had been thought until then. According to Lapparent de Broin (2001), this taxon from the Plio-Pleistocene boundary also shows similarities to the genera *Sakya* Bogachev 1960 and *Clemmydopsis* Boda 1927. Chkhikvadze (1989) and Danilov et al. (2012, 2013, 2017) referred to the genus *Melanochelys*, in the latter work, these are listed in open nomenclature under *Geoemyda*. No relevant section remains are preserved in either sample besides from the confirmed ectoplasm (Plate 3).

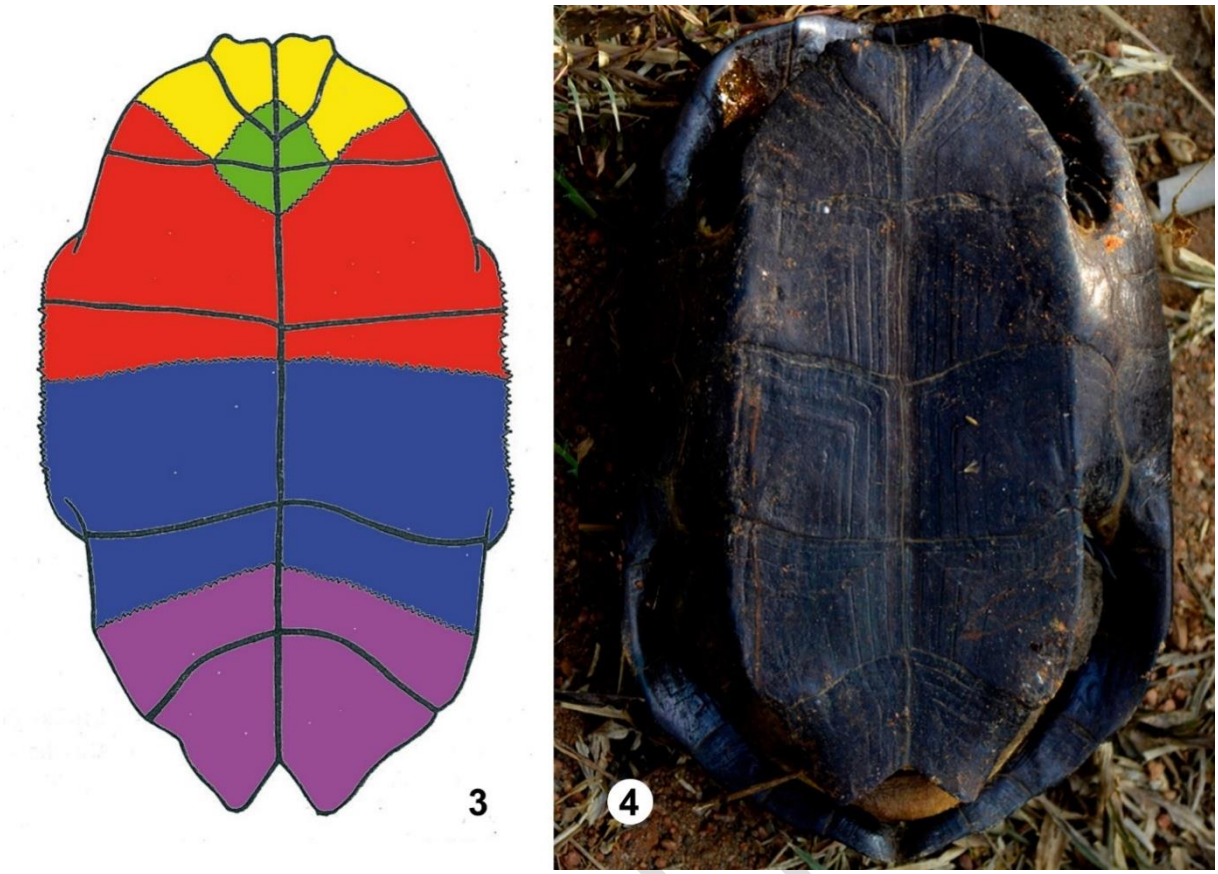

Figure 3. *Melanochelys mossoczyi*, schematic plastron view according to Młynarski: epiplastrals = yellow, entoplastron = green, hyolastrals = red, hypoplastrals = blue, xiphiplastrals = violet. **4)** *Melanochelys trijuga* (Schweigger, 1812), plastral view according https://indiabiodiversity.org/species/show/238667 detected on 24.01.2024, 7.44 pm.

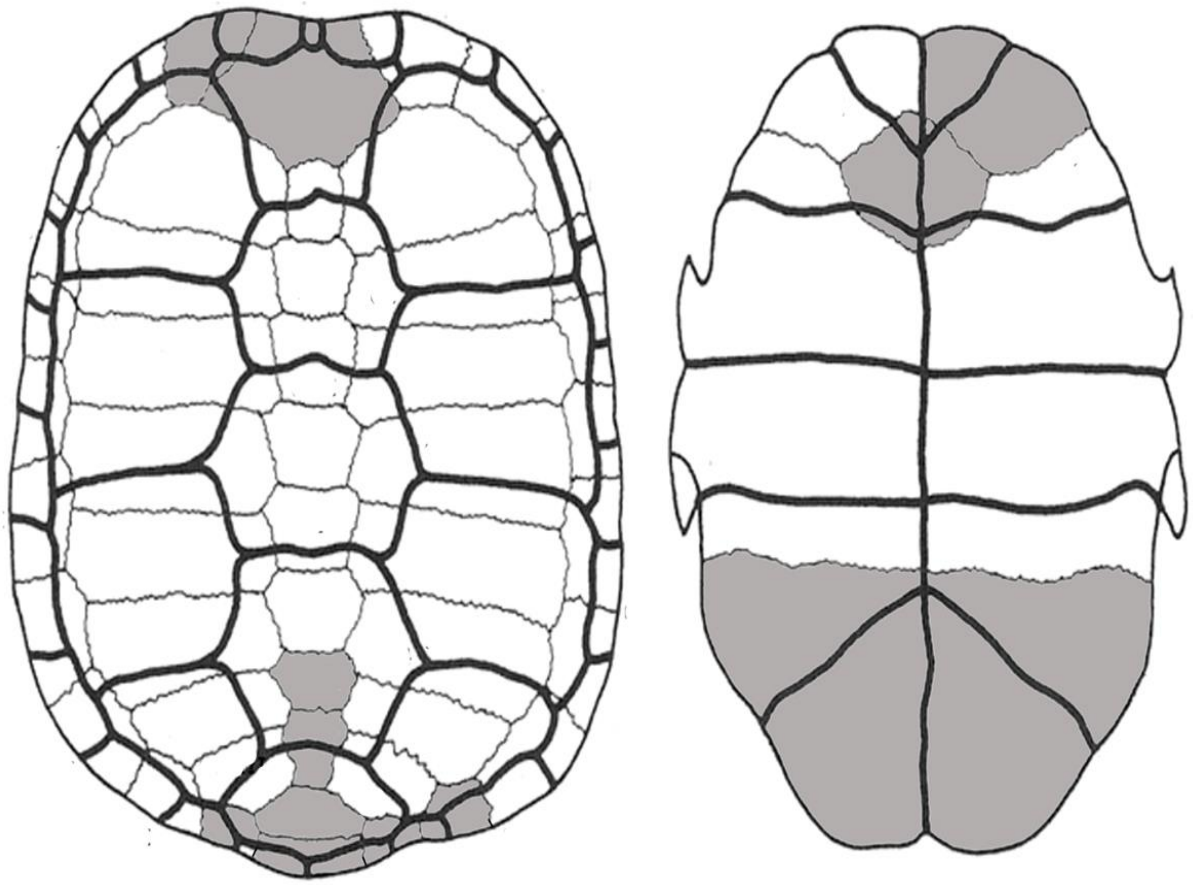

Figure 5. A schematic representation of the shell of a pond turtle as in Figure 2 shows the distribution of the preserved shell parts of the original material of *G. mossoczyi*.

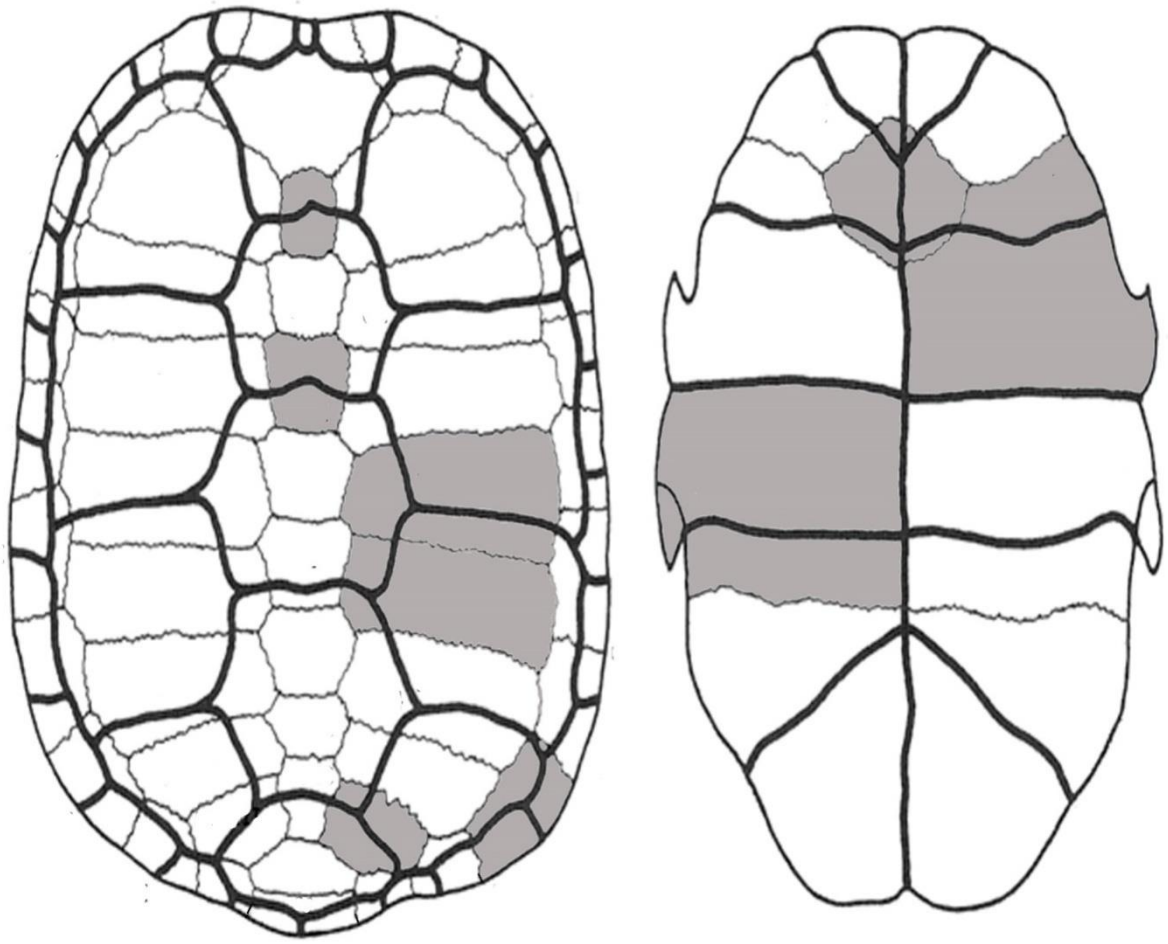

Figure 6. A schematic representation of the shell of a pond turtle, as in Figure 2, shows the distribution of the preserved shell parts of the original material of *G. m. wetterauensis.*

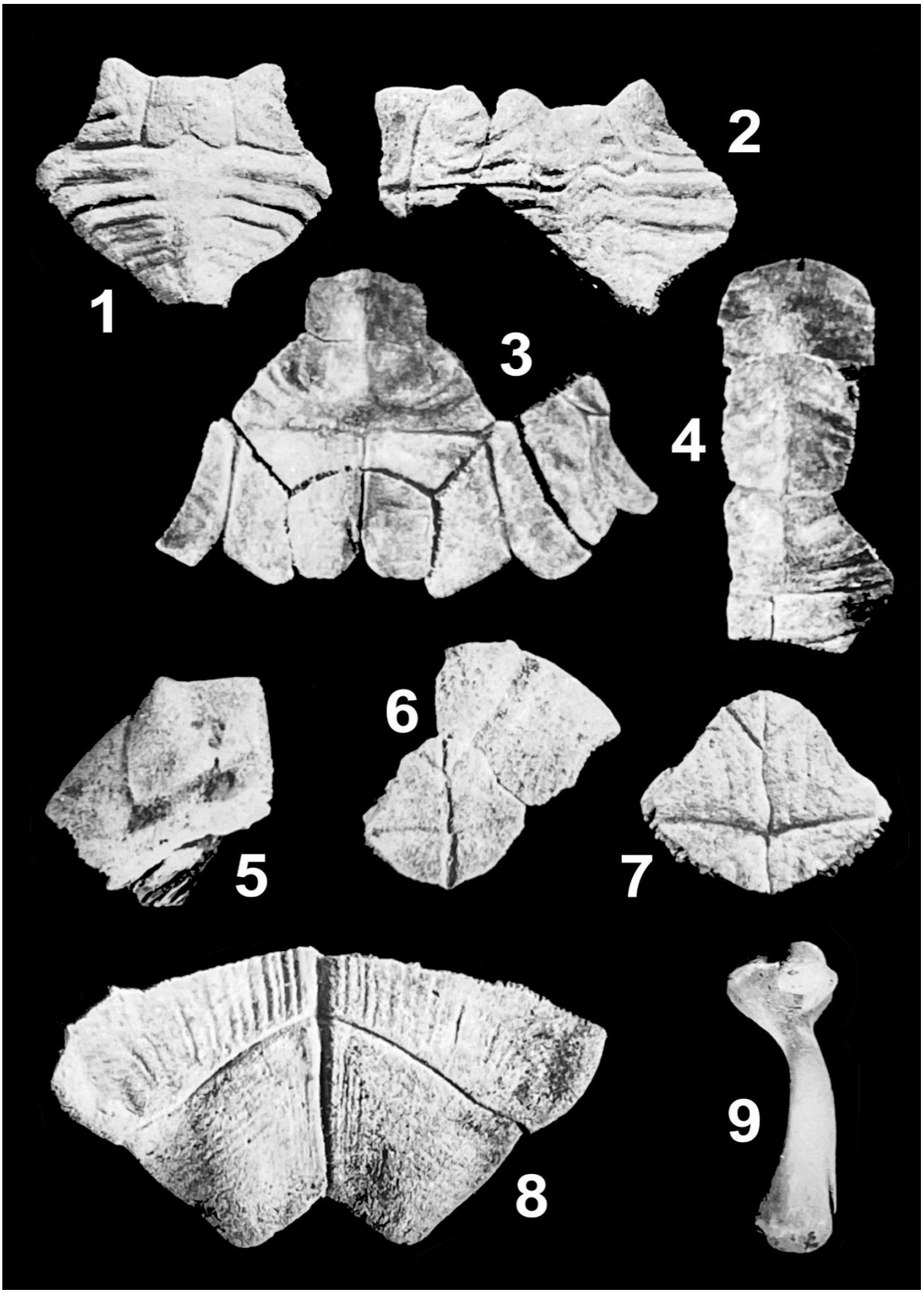

Plate 1. *Melanochelys mossoczyi*, original material according Młynarski (1964): 1 = nuchal plate, adult (length 27 mm, width 31 mm); 2 = nuchal plate fragment with left first peripheral fragment, adult (length 23.3 mm, width 33.2 mm); 3 = pygal part of the carapace with meta-neutrals I-II, pygal, right peripheral X and both XI, adult (length 36 mm, width 56 mm); 4 = last neural plate with metaneural I, adult (length 37.8 mm); 5 = epiplastral plate visceral, adult (length 43.4 mm, width 22.1 mm); 6 = epiplastral plate

and entoplastron, juvenile (length 25.6 mm); 7 = entoplastron, adult (length 19.8 mm); 8 = both xiphiplastrals, adult (length 47 mm, width 73 mm); 9 = left humerus, juvenile (length 19.8 mm).

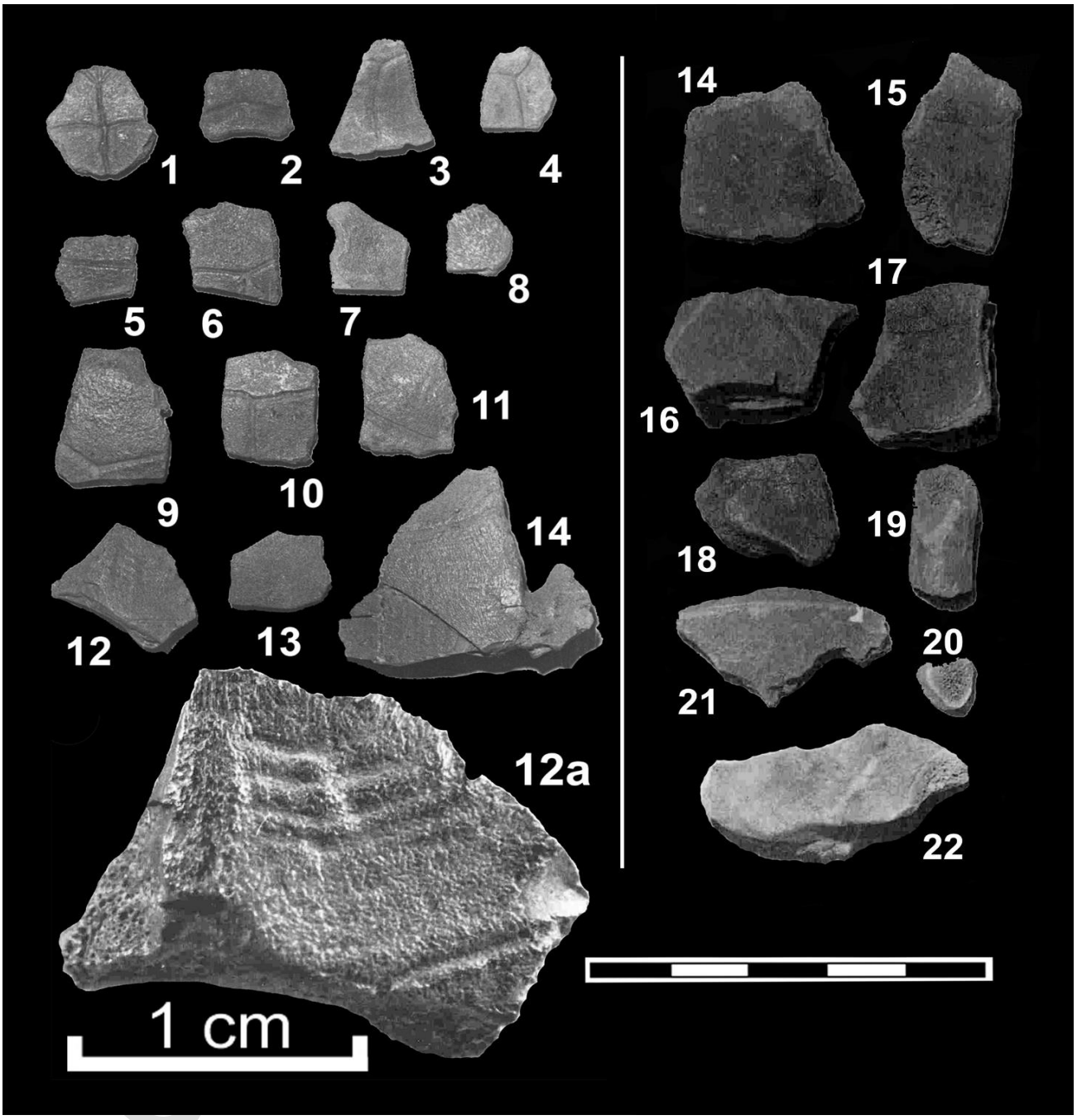

Plate 2. *Melanochelys mossoczyi* (syn. ssp. *wetterauensis*): MSB IB k 313, original material to Karl (1983), explanations in the text, scale 5/ 1 cm.

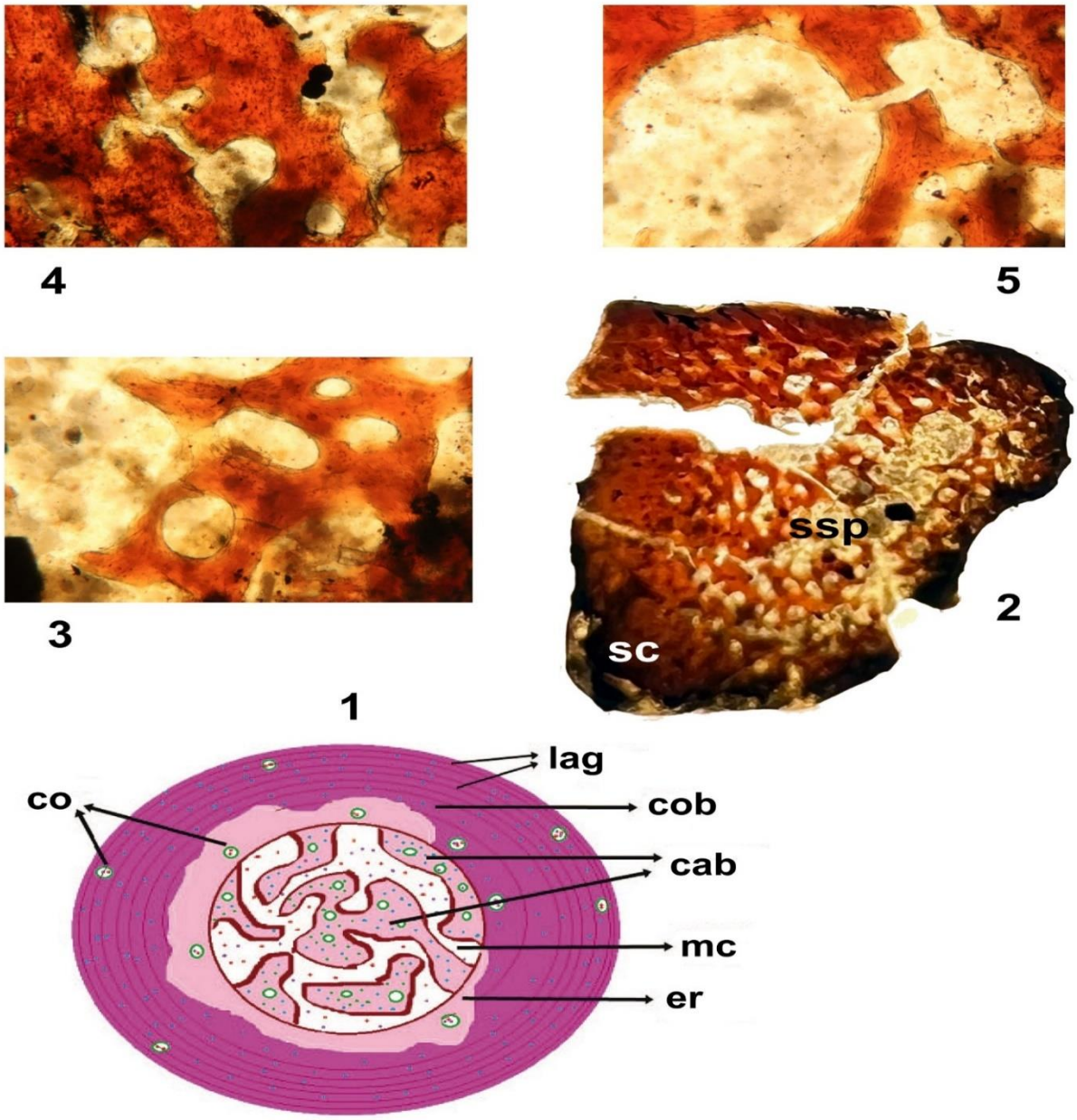

Plate 3. *Melanochelys mossoczyi* (syn. ssp. *wetterauensis*): MSB IB k 314, original material to Karl (1983).

Plate 3.1. Schematic view of a hypothetical freshwater turtle humerus cross-section according to Çiçek et al. (2016).

Plate 3.2 Light micrograph of a thin section of extremity fragment NWSM IE k 314.

Plate 3.3-3.5 Enlarged sections of the *Substantia spongiosa.*

Abbreviations: so - secondary osteon, lag - lines of arrested growth, cob - compact bone, cab - cancellous bone, mc - marrow cavity, er - endosteal resorption, sc - substantia compacta, ssp - substantia spongiosa. Photos Ivonne Przemuß, Friedrich-Schiller-University Jena.

[1] NWSM=Natural Science Collections Meiningen (old)

Dataset for plastral character analysis with PARS: 1- ento l<b, 2 - ento l=b, 3 - ento l>b, 4 - gular suture anterior, 5 - gular suture medial, 6 - hum-pect posterior, 7 - hum-pect medial, 8 - Sculpture present, 9 - Gularzack present, 19 - fusions of horn shields present, 11 - movable shell elements present.

Mauremys caspica 10010100000/ *Melanochelys eureia* 01010011101/ *Melanochelys mossozcyi* 01010011101/ *synonym wetterauensis* 01010011?01/ *Melanochelys malustensis* 01010011?01/ *Clemmydopsis sopronensis* 10010101010/ *Sakya pontica* 10001010010/ *Emys orbicularis* 10010100001/ *Ptychogaster emydoides* 00100100101/ *Testudo marginata* 10010001000

using Macarovici & Vancea (1960).

PARS - Discrete character parsimony algorithm, version 3.6a3, 4 trees in all found

1 - (*Sakya pontica*:5.00,(*Testudo marginata*:1.00,*Clemmydopsis sopronensis*:1.00):1.00,(*Emys orbicularis*:0.00,(*Ptychogaster emydoides*:2.00,(*Melanochelys mossoczyi*:0.00,*synonym* ***wetterauensis***:0.00, *Melanochelys malustensis*:0.00, *Melanochelys eureia*:0.00):4.00):2.00):1.00,*Mauremys caspica*:0.00)[0.2500];

2 - ((*Testudo marginata*:1.00,*Sakya pontica*:4.00):1.00,*Clemmydopsis sopronensis*:2.00,(*Emys orbicularis*:0.00,(*Ptychogaster emydoides*:2.00,(*Melanochelys mossoczyi*:0.00, *synonym* ***wetterauensis***:0.00, *Melanochelys malustensis*:0.00, *Melanochelys eureia*:0.00):4.00):2.00):1.00,*Mauremys caspica*:0.00)[0.2500];

3 - (*Testudo marginata*:2.00,(*Sakya pontica*:4.00,*Clemmydopsis sopronensis*:1.00):1.00,(*Emys orbicularis*:0.00,(*Ptychogaster emydoides*:2.00,(*Geoemyda mossoczyi*:0.00,*synonym* ***wetterauensis***:0.00,*Geoemyda malustensis*:0.00,*Geoemyda eureia*:0.00):4.00):2.00):1.00,*Mauremys caspica*:0.00)[0.2500];

4 - ((*Ptychogaster emydoides*:4.00,*Emys orbicularis*:0.00):1.00,(*Clemmydopsis sopronensis*:1.00,(*Testudo marginata*:0.00,(*Sakya pontica*:4.00,(*Melanochelys mossoczyi*:0.00,*synonym* ***wetterauensis***:0.00, *Melanochelys malustensis*:0.00, *Melanochelys eureia*:0.00):4.00):1.00):1.00):1.00,*Mauremys caspica*:0.00)[0.2500];

Abundance of the vertebrate fauna of Wölfersheim

Tobien (1952) gives the following taxa list for the Wölfersheim fauna, including the mammals: *Anancus arvernensis* (Croizet & Jobert, 1828); *Zygolophodon borsoni* (Hays, 1834); *Tapirus arvernensis* Croizet & Jobert, 1828; *Dicerorhinus* (syn. *Rhinoceros*) *megarhinus* (De Christol, 1834); *Sus minor*; Cervidae Goldfuss, 1820; *Ursus arvernensis* Croizet & Jobert, 1828; *Pareilurus* Schlosser, 1899; *Pannonictis* Kormos, 1931; *Mustela palermina* Petényi, 1934; *Castor* Linnaeus, 1758; *Trogontherium* Fischer von Waldheim, 1809; Sciuridae Gray, 1821; Glires Linnaeus, 1758 (=Myoxidae); *Mus* cf. *sylvaticus* Linnaeus, 1758; Cricetidae Kurten & Anderson, 1980 (=Microtinae); *Prolagus* Pomel, 1853; Leporidae Fischer von Waldheim, 1817; *Desmana* Guldenstaedt, 1777; *Galemys* Kaup, 1829; Talpidae Fischer von Waldheim, 1817; Soricidae Fischer von Waldheim, 1814; *Macacca* Lacépède, 1799; furthermore reptiles like Lacertilia Owen, 1842; amphibians like Anura Fischer von Waldheim, 1813 and fishes like Cyprinodontoidae Gill, 1865. The turtle material is classified here as the Geoemydid turtle, and *Melanochelys* is the only one described from that locality, so far. The composition of the

complete fauna of upper Pliocene Wölfersheim shows members of a forest biotope around a lake or swamp area which formed a lignite forest (Brown coal).

Conclusion

The first fossil species found in this area was first described by Wegner (1913), later Mlynarski (1964) described a new species (*Geoemyda mossoczyi* Mlynarski, 1964) from the Pliocene of Poland, and these animals were mentioned together with the form of Haji Naka. The two broken shells of this specimen are thought to be from *Geoemyda aff. mossoczyi*, briefly described and partially described by Mlynarski (1966) in a study of turtle fossils from a Hungarian collection, which included broken shells of *Trionyx sp. and P. polynous* from Sandberg Hill. Khosatzky and Mlynarski (1966) mentioned *G. mossoczyi* and *Geoemyda sp*. in their review of the European fossil Geoemyda Gray, 1834 (s. lat.) from Ivanovce (Danilov et al., 2012). Initial description and key points are taken from Khosatzky & Mlynarski (1966) and MÅynarski (1969, 1976). *Melanochelys mossoczyi* from Hajnacka (Khosatzky & Redkozubov, 1989), synonymous with *mossoczyi* (TEWG, 2015), is most similar to *Melanochelys mossoczyi* in terms of proportions of internal networks, location of body fluids and others, "Hajnacka Neck, by Mlynarski (1966, Ab. 6) There is no overlap with pleura 1, whereas pleura 1 described in this paper suggests overlap. Khosatzky and Redkozubov (1989) considered the second characteristic of the diagnosis of *M. pidoplickoi* (Khosatzky, 1946), a species first described as *Clemmys pidoplickai* (Khosatzky, 1946) from the Pliocene of Ukraine, but later described from most of the Pliocene Mostizen of Moldavia and Ukraine (Khosatzky and Redkozubov, 1989). Some authors have identified *M. mossoczyi* and *M. pidoplickoi* are synonymous and differences between them are explained as divergences (Taraschuk, 1971; Chkhikvadze, 1983). Until the *M. mossoczyi/pidoplickoi* issue is resolved, we consider "*Melanochelys*" from Hajnacka to be "*Melanochely*s"; see Mossoczyi (Danilov et al., 2012) for a comprehensive discussion and conclusion. Shell length approx. 20 cm in specimen of *Geoemyda (Heosemys) mossoczyi wetterauensis* – Karl, 1983 [Late Pliocene, Wetterau, Hesse, Germany], referred to as *Melanochelys mossoczyi wetterauensis*; Upper Pleistocene boundary may be referred to as Sakya Bogachev 1960 or Clemmydopsis Boda 1927, Chkhikvadze (1989) and Danilov et al. (2012, 2013) named the taxon *Melanochelys*. The Late Pliocene taxa *Geoemyda boristhenica* and *Geoemyda wetterauensis* may or may not be distinct, but are now tentatively listed under *M. mossoczyi*. As a rule, the information used so far is fragmentary, so we need more data. The character complexes of *Mossoczyi, wetterauensis, malustensis,* and *eureia* are close to each other in all possible trees, which may indicate systematic similarities, at least in the same taxon, *Melanochelys mossoczyi wetterauensis*.

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