THE TRANSYLVANIAN DINOSAUR MUSEUM PROJECT: THE CONTRIBUTION OF GEOECOMAR TO VALORIZE AND PROMOTE THE PALEONTOLOGICAL HERITAGE OF ROMANIA

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Abstract. Interested in geoconservation, interpretation and promotion of the geological heritage, since 2014 NRDI GeoEcoMar is partner in the Transylvanian Dinosaur Museum project, aiming to reconstruct the late Cretaceous dwarf dinosaur fauna and ecosystems of the Hațeg Island in the Tethys Sea. The three, life-size museum quality dinosaur reconstructions, done in Alberta, Canada by world famous paleoartist Brian Cooley, were supported by GeoEcoMar in various ways. The institute sponsored the sculpture of the feathered theropod *Balaur bondoc*, offered incentives for the Kickstarter project "A Transylvanian dwarf dinosaur needs a ride home" which funded the travel from Calgary through Antwerp to Hațeg of the sauropod titanosaur *Magyarosaurus dacus*, offered logistic support for the *Magyarosaurus* journey in Romania and for the releasing from customs of the ornithopod *Zalmoxes robustus*. The workshops for children and exhibitions prepared reflect the interest of GeoEcoMar in geoheritage promotion through educational and outreach activities.

Key words: Hațeg Geopark, dwarf dinosaurs, reconstruction, exhibition, workshop

1. INTRODUCTION

As an institute of geology and geoecology, GeoEcoMar is willing to take part in conservation and promotion of the natural heritage. Consequently, in 2010, the institute applied for and was granted the custody of three marine protected areas included in the Natura 2000 Network. Being directly involved in the management of protected areas, the institute is interested to collaborate with other custodians and administrators of protected areas, as well as to use natural heritage and geological sites for education (Seghedi *et al.*, 2013; Begun *et al.*, 2013). Geological education is a necessity, especially since in Romania earth sciences do not have an adequate public presence, while scientific literacy in geology of the people continues to be rather low. Geology is no longer part of the school curricula for almost 20 years, except some basic concepts included in geography programs. As such, the number of young people interested in a career in earth sciences and choosing to enroll to the faculties of geology is diminishing every year.

Considering also the necessity to promote its image and increase its visibility, education and promotion of earth sciences became an important objective in the research strategy of NRDI GeoEcoMar since 2008 (Oaie, 2012).

GeoEcoMar has a long history of collaboration with the geology chairs from the Universities of Bucharest and Iași, in order to train both graduate and undergraduate students in the fields of marine geology and sedimentology. The institute was also willing to be directly involved in activities related to school education, as well as in outreach activities for the general public, in order to increase awareness on earth sciences and their importance for the society. For several years, GeoEcoMar was involved in creating exhibitions on the natural heritage and fossil sites from Dobrogea, the land between the Danube and the Black Sea (Oaie, 2012;

Saint Martin, 2013), in organizing events like "Earth Science Week", or workshops for school children (Oaie, 2012). Already in 2010, GeoEcoMar started to organize public conferences on geological themes, held at its conference rooms in Bucharest and Constanța. One public conference, on geoconservation, organized in partnership with the Geological Society of Romania, was given by professor Jose Brilha from the University of Minho, Portugal, specialist in geoconservation, founder and former editor in chief of the journal Geoheritage. The institute was also involved in publishing books and organizing meetings on geoheritage (Saint Martin *et al.*, 2010a; Saint Martin, 2013). Lately, the institute organized activities within the project "The school differently" of the Ministry of Education, promoting protected areas and especially the marine protected areas in its custody (Menabit *et al.*, 2017). The direct benefit of these activities is the increased visibility of GeoEcoMar, as an engaged research institution in taking care of the future of earth sciences, environmental protection and promotion of the natural heritage.

In May 2011, the management team of GeoEcoMar responded to the request of Prof. Dan Grigorescu, at that time the manager of the Hațeg Country Dinosaur Geopark (HCDG), and signed a collaboration agreement with the University of Bucharest, the administrator of this UNESCO Geopark, part of the European Geoparks Network (EGN) and Global Geoparks Network (GGN) since 2005 (Andrășanu *et al.*, 2008, 2017). Among other issues, the collaboration agreement stipulated development and promotion of joint projects able to involve human resources, materials and logistics in common activities. However, the opportunity to collaborate with and support the Hațeg Geopark appeared only in the beginning of 2014, when the newly appointed director of the Geopark, the second author of this paper, invited GeoEcoMar to became partner in the Transylvania Dinosaur Museum Project (TDM) (Andrășanu *et al.*, 2015). Taking part in the museum concept development and its related educational programs will enable GeoEcoMar to contribute to education, training and public awareness. Young students and general public will better understand natural processes shaping planet Earth and human life and activity, contributing to geoconservation and interpretation of the geological and paleontological heritage.

This paper presents the contribution of GeoEcoMar to support the TDM project throughout 2014-2017. Although the museum is still a project in progress and constant funding is not secured, its concept, some of its exhibits, educational activities and promotional materials are ready or already designed.

2. THE TRANSYLVANIAN DINOSAUR MUSEUM PROJECT

The TDM project was initiated in January 2014 by two NGO's (Geomedia Association and GeoD Association for promoting geodiversity) and two Canadian artists, dinosaur sculptor Brian Cooley and painting artist Mary Ann Wilson, through their firm, Cooley & Co Ltd (Andrasanu *et al.*, 2015; Seghedi and Andrășanu, 2017). The partnership soon enlarged to involve GeoEcoMar, University of Bucharest (HCDG) and the General Berthelot parish council. Although the project is seeking for more funds and a proper location, everything which was achieved so far was done through the financial contribution of the project partners, three dinosaur's reconstructions have already been made.

The aim of the TDM project is to promote geosciences and geological heritage of the Hațeg Country based on the interpretation of the world most interesting fauna of dwarf dinosaurs. TDM will promote the geopark concept and support HCDG in its activities of conservation of natural and cultural heritage, and will contribute to socio-economic and cultural development of local communities.

Specific objectives of the project include providing museum quality, life-size reconstructions of the dinosaur taxa that lived on the Hațeg Island 70 million years ago, as well as of other animals living in their shadow (pterosaurs, enanthiornitine birds; microvertebrates like amphibians, crocodiliforms, lizards, fresh water fishes, mammals), developing the brand "Dinosaurs from Hațeg Country" and development of a visiting, educational and interpretation center for geological heritage. The museum will be accomplished by the promoters, in close partnership with local administrations and will have its own management structure.

The year 2014 was a milestone for Hațeg Geopark in safeguarding its international status during the revalidation mission of two UNESCO experts. The project partners decided that they needed to have life size dinosaur reconstructions ready by the date of evaluation. Brian Cooley estimated that he had the means and the time to provide three dinosaur sculptures by July 2014: *Balaur bondoc*, *Magyarosaurus dacus* and *Zalmoxes robustus*. Till July the first three museum quality reconstructions were ready, and a website and facebook page of the TDM became active (https://www.faceboo.com/Transylvania-Dinosaur-Museum-140392742798090/). The Facebook page of the Kickstarter project reflected the journey of *Magyarosaurus* (https://www.facebook.com/dinoroadtrip). A media campaign was also launched in July 2014, once the sculpture of sauropod *Magyarosaurus dacus* arrived safely to Romania.

GeoEcoMar contributed to the TDM project by sponsoring one of the sculptures, contributing to the museum concept and to the transportation of reconstructions of other two dinosaurs, granting incentives, logistic support, elaborating two exhibitions and organizing three workshops for first to fifth grade school children.

3. RECONSTRUCTING ACCURATE DINOSAUR MODELS

The goal of the TDM project is to show visitors the most scientifically accurate, life-sized, fleshed out dinosaur sculptures possible. The more accurate a reconstruction is, the

more value it has. In order to achieve this goal, artistic representations should be done with adequate research and dialogue between the sculptor and the scientists most familiar with the dinosaur being reconstructed (Cooley, 2011). This is the way Brian Cooley is doing his reconstructions.

To sculpt an accurate life-size dinosaur is also a time consuming process, as several steps are necessary to make a detailed reconstruction. A first, extremely important step is researching the fossil by gathering as much information as possible from published papers on the species to be reconstructed and, if possible, examining fossils hosted at museums or in various collections. For an accurate reconstruction, it is necessary to have a complete skeleton, or if this is not possible, to have as many skeleton data as possible, in order to measure skeletal elements. Nearest related species are used to make educated guesses regarding the nature and appearance of missing skeletal elements. Joint articulation and likely habits are discussed with knowledgeable scientists to determine possible poses. Bird and lizard anatomy are used as a base for the muscles. This leads to concept drawings (Fig. 1), and in the case of large dinosaurs, a one-tenth-scale model (Fig. 2). Once the skeleton is completed, it needs to be measured in order to make the armature for the clay model necessary for the final, life-size cast, which is done using the mold and cast method.

A life-size clay model is created next, with a steel frame, in order to be molded to make the cast. The clay model is then coated with a release agent, to safely free the model from the mold material. Then flexible material (such as liquid rubber) is painted on the exposed side of the model, which can be reinforced with a sturdier material (like fiberglass sheets). When set, the finished mold is removed.

The next step is skin texturing, which is a very laborious process, as each segment of the skin is done mannually, the size and distribution of scales being different according to the place on the dinosaur body (Fig. 3). A lot of atention is also given to feet details. After texturing, the sculpture is painted using pigment. Eventually, a protective clear coat (a two part industrial urethane designed for painting cars) is applied on the paint.

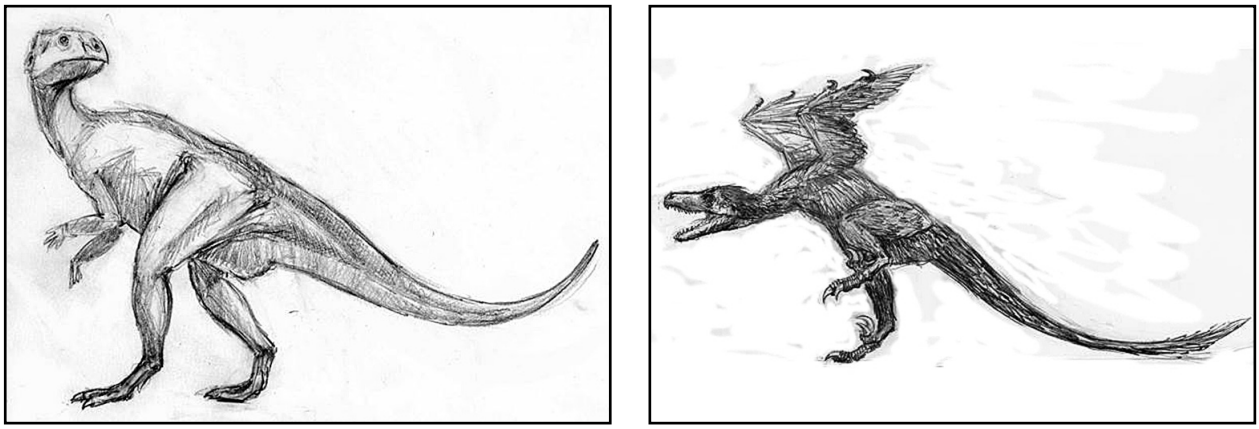

Fig. 1. Posture drawings for *Zalmoxes* (left) and *Balaur* (right) by Brian Cooley.

Fig. 2. *Balaur*, clay model on wire skeleton, scale 1:10 (left); clay model with paper wings (right). Photo courtesy of Brian Cooley.

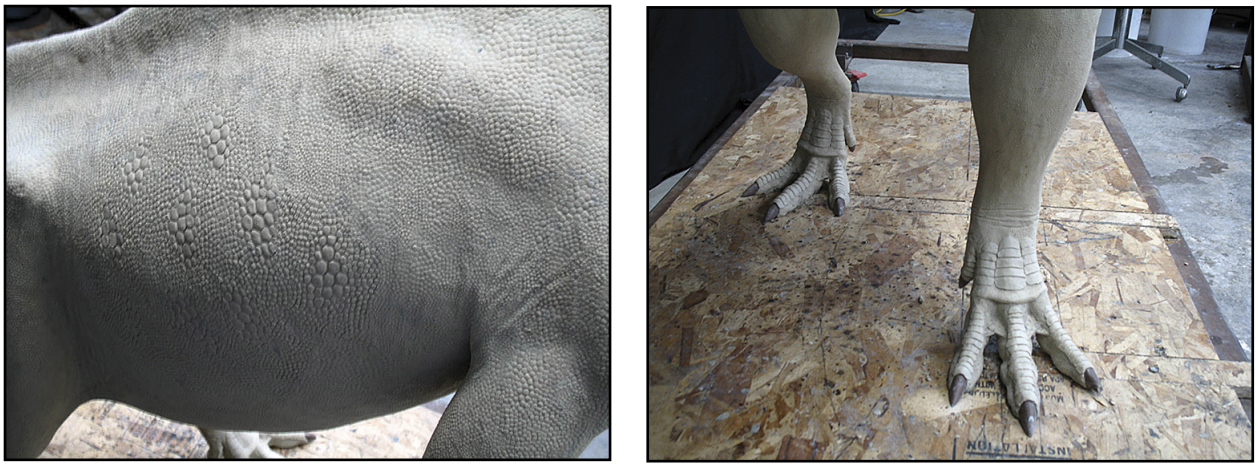

Fig. 3. *Zalmoxes* textured. Details of skin (left) and feet (right). Photo courtesy of Brian Cooley.

Following all these steps, the whole process to create a dinosaur model takes at least 6 months, and often more, depending also on the size of the sculpture. This also involves the work of several artists, beside the sculptor.

4. THE DINOSAURS CREATED FOR THE TDM IN 2014

In order to make three dinosaur sculptures for the TDM in less than six months, the process of dinosaur reconstruction needed to be shortened. This was possible only by using already existing molds for two dinosaurs, so that only one (*Balaur*) would be reconstructed from scratch. Using existing molds also considerably lowered the price of each sculpture. Brian had two molds in his workshop which he could use. One was the mold for *Zalmoxes*, as *Z. robustus* was the first dwarf dinosaur reconstructed by Brian Cooley during 2007-2008 for the National Museum of Geology in Bucharest (Seghedi and Nailia, 2010; Saint Martin *et al.*, 2010 b). The other was a mold of a sauropod, which Brian had in his workshop since he reconstructed the *Alamosaurus* family for the Children's Museum in Indianapolis. Actually, he suggested to use a mold of a juvenile *Alamosaurus* sauropod, which had the dimensions of the adult *Magyarosaurus*, and modify the sculpture later with adult features. This was an option especially that mainly isolated, disarticulated bones of *Magyarosaurus* were found in the Hațeg area (Weishampel and Jianu, 2011), so that a reconstruction based on the skeletal elements was not possible. *Alamosaurus sanjuanensis* was a gigantic Late Cretaceous Titanosaurian sauropod, found in southern USA, comparable in size with the largest sauropod, *Argentinosaurus* from South America (Fowler and Sullivan, 2011). These authors estimated that the adults attained more than 30 m in length and weighed more than 32 tons, but a juvenile *Alamosaurus* was the size of an adult dwarf sauropod such as *Magyarosaurus*. After studying the paper on the osteoderm found in Oltoane Hill (Csiki, 1999), as well as the literature on osteoderms of titanosaurian sauropods (Salgado, 2003; Curry Rogers, 2005; Curry Rogers *et al.*, 2011; D'Emic *et al.*, 2009; Weishampel and Jianu, 2011), two types of osteoderms were created and multiplied in Brian Cooley's workshop for the *Magyarosaurus* sculpture. The likely distribution of the osteoderms on the model was extensively discussed with Zoltán Csiki-Sava.

4.1. Scientific data on Balaur bondoc

The first dinosaur chosen for TDM was the feathered dinosaur *Balaur bondoc*. Its fossil remains were found by Matyás Vremir at Sebeș-Glod in SW Transylvania, as a partly articulated postcranial skeleton belonging to a single individual, a theropod, velociraptorine-like dromaeosaurid (Csiki *et al.*, 2010). After studying the remains of this turkey-size dinosaur, it was obvious that some forelimb material with a peculiar surface texture recovered at Tuștea nesting site (or Oltoane Hill) in Hațeg basin belong to the same species, but to a bigger individual (Brusatte *et al.*, 2013). Disarticulated theropod dinosaur skeletal elements previously found at Tuștea were ascribed to a dromaeosaurid, closely related to *Saurornitholestes langstoni* (Jianu and Weishampel, 1997; Jianu *et al.*, 1997; Csiki *et al.*, 2010). These scattered skeletal bone fragments were assumed to belong to one individual, dismembered after death and eventually burried in a well drained flood-plain environment subjected to pedogenesis (Brusatte *et al.*, 2013). An alternative interpretation of *Balaur bondoc* as a basal avialan, a flightless bird with a herbivorous or omnivorous diet (Cau *et al.*, 2015), was published a year after the *Balaur* sculpture was ready, thus the reconstruction created for the TDM features *Balaur* as a paravian theropod.

4.2. Scientific data on Zalmoxes

Zalmoxes robustus, the most frequently found dinosaur in Transylvania, was a bipedal ornithopod dinosaur from the Rhabdodontidae clade, closely related to iguanodontians (Weishampel *et al.*, 2003). It was first described by Nopcsa (1897) as *Mochlodon robustum*, and later as *Rhabdodon robustum* (Nopcsa, 1915), as the latter name had precedence over the former (Weishampel and Jianu, 2011). The name *Zalmoxes* was given by Weishampel *et al.* (2003), when the authors revised the *Rhabdodon* material of Nopcsa. They found that al-

though closely related to *Rhabdodon priscus* from France and Spain, the two species from Romania, *Z. robustus* and *Z. shquiperorum*, are more related to each other. *Zalmoxes* was a 3-4 m long and 1.5 m high herbivore, with a horny beak. Adult individuals of *Z. robustus* were smaller than *Z. shquiperorum* and *Rhabdodon* and therefore considered paedomorphic dwarfs (Weishampel *et al.*, 2003).

4.3. Scientific data on Magyarosaurus

The first sauropod bones found in the Late Cretaceous deposits at Sânpetru were identified as *Titanosaurus dacus* (Nopcsa, 1915). Almost two decades later, the bones were ascribed to three species of the same new taxon, *Magyarosaurus* (von Huene, 1932), named as such as in the memory of Nopcsa, who was Hungarian. The newly established species were *M. dacus*, *M. hungaricus* and *M. transsylvanicu*s (von Huene, 1932). Phylogenetic studies indicate that *Magyarosaurus* is a dwarf dinosaur in the clade Titanosauria, related to *Rapetosaurus* in the family of Saltasauridae (Curry-Rogers, 2005).

Sauropods are quadrupedal herbivores and titanosaurian sauropods attain the largest sizes. *Magyarosaurus* was estimated to be 6 m in length (Curry Rogers, 2005), weighing 900 kg (Stein *et al.*, 2010), or even less (Paul, 2010), around 850-900 kg (Weishampel and Jianu, 2011; Grigorescu *et al.*, 2014). Detailed osteological studies confirmed that the fossils found so far belong to adult individuals, but their decreased growth rates and small body size represent adaptations to life on a Cretaceous island (Stein *et al.*, 2010), as earlier suggested by Nopcsa (2015). Like other titanosauridae, *Magyarosaurus* also displayed a dermal armor, consisting of isolated osteoderms (Csiki, 1999).

The bones recovered so far belong to about 10 individuals of *Magyarosaurus* sp. The holotype, hosted at the British Museum of Natural History, is represented by a set of vertebrae (Nopcsa, 2015; Weishampel and Jianu, 2011). Larger bone remains, exposed in museums, include humerus and coracoid (at the Museum of Dacian and Roman Civilization in Deva), scapulas (one exposed at the Musee d'Histoire Naturelle in Brussels and the other at the Science and Art Center in General Berthelot), limb bones (at the Natural History Museum, Vienna). A distal caudal vertebra, located near the middle of the tail and discovered at Râpa Roşie near Sebeş, was ascribed to *M.* sp. (Codrea *et al.*, 2008). Other bones and ungulas are stored in the paleontology collections of the Faculty of Geology and Geophysics, University of Bucharest, Babes-Bolyai University of Cluj and other museums, including those mentioned above. No remains of the skull or teeth were found.

5. CONTRIBUTIONS OF GEOECOMAR TO THE TDM

GeoEcoMar contributed to each of the three dinosaur sculptures in different ways, which will be detailed further. The institute also contributed to the concept and execution of two exhibitions, one in 2015, "Brian Cooley – dinosaur art", dedicated to Brian Cooley's work on dinosaurs, the other, in 2017, "The dwarf dinosaurs from Haţeg basin", a travelling exhibition dedicated to Haţeg dwarf dinosaurs. Two workshop for children were organized in General Berthelot in July 2017, and another one took place in the beginning of June 2017 on the board of Halmyris, the floating laboratory of GeoEcoMar moored on Sf. Gheorghe distributary, at Uzlina.

5.1. Logistic support for Zalmoxes

The *Zalmoxes* sculpture (Fig. 4) is the twin brother of the reconstruction delivered by Brian Cooley to the National Museum of Geology in Bucharest in the spring of 2009 (Seghedi and Nailia, 2010). *Zalmoxes* was the first museum quality reconstruction of a Haţeg dwarf dinosaur and was based on the scientific descriptions of the skeleton by Weishampel *et al.* (2003). It's posture suggests that the ornithopod is looking back at a strange noise made by a potential predator (Fig. 1).

Fig. 4. *Zalmoxes* head, exquisite detail of the finished model. Photo courtesy of Brian Cooley.

The *Zalmoxes* sculpture for the TDM was finished by 23th of March 2014. The sculpture was shipped by container to Hamburg and transported from Germany to Bucharest by lorry. However, this was the last sculpture to arrive in the Geopark, as it was released from the customs in Bucharest on the 29th of July 2014. Although the VAT costs were jointly supported by Geomedia Association (the HCDG administration partner) and the Geological Society of Romania, GeoEcoMar provided the papers for the customs, in order to release the sculpture. GeoEcoMar also helped with the transportation of the sculpture from the customs to the GeoEcoMar headquarters in Bucharest. Here it was hosted in the garage of the institute, where the sculpture was removed from its crate before being taken to Haţeg by car (Fig. 5).

5.2. Sponsorship for the feathered dinosaur sculpture Balaur bondoc

The reconstruction of *Balaur* was sponsored by GeoEcoMar, following a sponsorship letter received from the director of the HCDG and approved by the executive board of GeoEcoMar. After granting the sponsorship, the sculpture was commissioned to Brian Cooley and GeoEcoMar had

Fig. 5. *Zalmoxes* at GeoecoMar in August 2014, as it is removed from its crate (above) and moved to the car for transportation to Hațeg (below). Photo: Antoneta Seghedi.

signed a contract with Cooley & Co. Ltd. The scientific data used to reconstruct *Balaur* were those published in the papers of Csiki *et al.* (2010) and Brusatte *et al.* (2013).

In order to create the sculpture, Brian Cooley used the skeleton from the type locality, Sebeș-Glod, recalculating the dimensions of bones for the fossil remains found at Tuștea. The posture of Balaur was inspired from that of *Caracara*, a bird of prey in the family Falconidae. Dr. Zoltán Csiki-Sava from the Faculty of Geology and Geophysics (University of Bucharest), the scientific consultant for the TDM project, was in constant communication with Brian for the reconstruction of *Balaur*.

The Balaur sculpture is indeed unique, as it was done without a cast. The sculpture of Balaur was finished on the 28th of April 2014. Close-ups of the feet and head, with exquisite details of skin texture, are shown in Figure 6.

By mid June 2014, the *Balaur* sculpture was brought to Bucharest by plane. In order to save the transport money and gain time, Brian Cooley has cut the sculpture into 3 parts to fit in his chek-in luggage. These parts were assembled together in a room at the House of Science and Art in General Berthelot. The thorough work of gluing the feathers to the *Balaur* sculpture took two weeks for Brian Cooley and Mary Ann Wilson (Fig. 7), using the feathers from several black turkeys and two roosters.

A minute for transferring the sculpture was signed in July by Gheorghe Oaie and Alexandru Andrășanu, at the opening of the exhibition "Griffins, Dragons and Dinosaurs", hosted at the Visitors Center of the HCDG in Hațeg (Fig. 8). The exhibition was opened on the 26th of July 2014, in the presence of the general director of GeoEcoMar (Fig. 9). At the entrance in the exhibition, a plate acknowledges the sponsorship of the Institute and the help of people from GeoEcoMar who contributed to this permanent exhibition.

5.3. Support for the journey of Magyarosaurus

The sculpture of *M. dacus*, almost 7 m long and 3 m high, was ready by the end of May 2014 (Fig. 10). But as shipping costs to Romania were too high, Brian Cooley submitted a project to the Kickstarter platform (Andrășanu *et al.*, 2015; Seghedi and Andrășanu, 2017). Entitled "A Transylvanian dwarf dinosaur needs a ride home", this project had to rise the amount of minimum 22.500 CAD in a month time. Various incentives were offered in support of the project, depending on the amount pledged: post cards, sauropod skin cold cast bronze amulet, pendant and earrings cast from the skin of the sculpture (Fig. 11), Transylvanian dwarf dinosaur T-shirt, limited edition cold cast osteoderm, modeled after the only sauropod fossil osteoderm yet found in Romania, etc.

GeoEcoMar supported the Kickstarter project by offering two of the highest incentives. For a pledge of 3000 CAD, a 3 day river trip on the Danube Delta was offered, including accommodation and meals on the floating laboratory Halmyris and daily excursions aboard the boat Carina to various distributaries, channels and lakes. This package included transportation by car from Bucharest to Tulcea. For 6000 CAD pledged, the incentive was a 5 to 10 day Black Sea cruise aboard Mare Nigrum, the marine research vessel of GeoEcoMar, to see scientists of GeoEcoMar at work protecting marine habitats and species of the Black Sea. Excursion dates were flexible. Within a month, 127 bakers pledged 25,673 CAD and this project was funded, so that *Magyarosaurus* could travel home in style (https://www.kickstarter.com/projects/ 1318817492/a-transylvanian-dwarf-dinosaur-needs-a-ride-home).

For the journey of *Magyarosaurus*, GeoEcoMar adapted one of its boat trailers to be pulled by the lightest car in its car park, a Dacia Logan. Brian Cooley had to rent the car from GeoEcoMar, as he was driving abroad a car of an institution he was not employed to. GeoEcoMar also provided the documents necessary to transport the sculpture throughout Europe to Romania. In the beginning of July, Brian and Mary Ann left Bucharest driving the trailer to Antwerp, Belgium.

Fig. 6. Details of *Balaur* feet (left) and head (right). Photo: Gheorghe Oaie.

Fig. 7. Mary Ann Wilson gluing turkey feathers to the *Balaur* sculpture. Photo: Gheorghe Oaie.

Fig. 8. The finished model of *Balaur*, in the dedicated exhibition "Griffins, dragons and dinosaurs" in Hațeg, at the Visitor's Center of the Geopark. Photo: Gheorghe Oaie.

Fig. 9. At the opening of the exhibition "Griffins, dragons and dinosaurs", from left to right: Gheorghe Oaie, Alexandru Andrășanu, Marcel Huzoni and a member of the Hațeg city council. Photo: Antoneta Seghedi.

For the journey in Romania, GeoEcoMar offered logistic support for the Canadian team (accommodation on the floating lab Halmyris during the journey through Dobrogea, and at the guest rooms of the institute in Constanța and Bucharest) (Figs. 12-14). HCDG offered also support for crew travel in Austria, Hungary and Romania, accommodation and meals in Hateg and logistic support by Dan Horatiu Popa, at that time a volunteer of HCDG.

It was a unique experience to accompany *Magyarosaurus* on its travel across Europe with short stops in Paris, near UNESCO headquarter, Grube Messel Visitor Centre (Messel Pit UNESCO Site), Bergstrase Odenwald Global Geopark (Germany) and Bakony Balaton Global Geopark. In Romania it was much easier to predict when the sculpture could arrive in a certain locality and announce the press. So the teams of the Geopark and GeoEcoMar managed to organize meetings with the press in several localities (Deva, Tulcea, Constanța, and Bucharest).

Media coverage and documentary on Magyarosaurus journey

Press releases (from GeoEcoMar, HCDG and the Tulcea city hall) communicating the itinerary of the sculpture were taken over by agencies Agerpres and Mediafax. Central and local media also took over the story: Radio România Actualități, Radio România Cultural, Observator, ProTV, Digi 24, Romania actualități, Realitatea net, Adevărul, Formula AS, Radio Timișoara, Pecica news, Servuspress, Mesagerul hunedorean, Hunedoara liberă, Ziarul Văii Jiului, Telegraf online, Delta Journal, www.b365.ro, www.cluj.travel, www.mondonews.ro, etc. Interviews with Brian Cooley were taken by local TVs in Deva and Hunedoara. More than 25 articles were published and TV spots were broadcasted during July 20-24 2014, many of them emphasizing the role of GeoEcoMar as project partner. Images from this journey were posted on two Facebook pages, one created for the Kickstarter project https://www.facebook.com/ asauropodabroad/photos/, and the other for the TDM https://www.facebook.com/Transylvania-Dinosaur-Museum-140392742798090/. An interview about the involvement of GeoEcoMar in the TDM project was also published in Market Watch (Batali, 2015).

Since its release from the customs in Antwerp, the sauropod sculpture was accompanied by a crew from the Canadian TV. The documentary film made about the journey of Magyarosaurus by Anna Cooley was ready in the summer of 2016. Entitled "A Sauropod Abroad", the documentary already won several international prizes (Seghedi and Andrășanu, 2017). The film won the best feature documentary award at the Brașov International Film Festival and Market in the summer of 2016, and was dedicated to the memory of Gheorghe Oaie, general director of GeoEcoMar from December 2008 until his untimely death in July 2016.

Fig. 10. The making of *Magyarosaurus*. Artist Shane Hurl helping to finish texturing (upper left); Brian Cooley working on the tail (upper right); detail of the right hind leg (lower left); detail of the head (lower right). Photos courtesy of Mary Ann Wilson and Roxana Pirnea.

The Danube Delta trip

The last incentive for the Kickstarter project was granted during 1-7th of June 2017, as the baker and the sculptor could not visit Romania before. The baker who pledged the largest amount of money was Dieter Schlaffke from Canada, specialized in building fiber glass boats on which he often sails in the Pacific. Since Mare Nigrum did not have any cruise in June 2017, the guests settled for the other incentive, a trip to the Danube Delta. The two Canadians arrived in Romania on the 1st of June 2017. The first day we travelled from Bucharest to Murighiol by car. The Heras boat of GeoecoMar was used for traveling on the distributaries and canals in the Delta, as Carina boat was under repair (Fig. 15).

The trip schedule included travel by boat to Letea on the second day of the visit, to see the sand dunes of the initial spit of the Danube Delta and the oak forest growing on the fossil beach ridges. The third day a workshop was held onboard Halmyris, with children from schools in Mahmudia and Murighiol. The fourth day included travel by boat to Sfântu Gheorghe to visit the beach and Meleaua Sf. Gheorghe, full of birds. In the afternoon, the Canadian guests visited the Museum of local traditions in Dunavățu de Sus, managed by Camelia Ivanov, one of the teachers participating in the workshop onboard Halmyris. For the fifth day a trip to the lakes was organized, on the route canal Uzlina – lake Uzlina – lake Isacel – lake Isac. On the 6th of June the guests left Halmyris and travelled by car to Constanța, visiting Sărăturile Lake south of Murighiol, protected as a nesting site and the Heracleea

Fig. 11. Incentives offered to bakers of the Kickstarter project „A Transylvanian dinosaur needs a ride home". Above: the highest incentive was a cruise on the Black Sea on R/V Mare Nigrum of GeoEcoMar (*Magyarosaurus* visited the ship on the 22nd of July 2014), photo: Antoneta Seghedi. Below: incentives made of *Magyarosaurus* skin cold cast included earring (left), amulet (middle) and pendant (right). Photo courtesy of Mary Ann Wilson.

fortress at Enisala, where they could see the great view on the fossil landscape of the Black Sea littoral, before the closure the littoral lagunes. The next day a visit to Mare Nigrum took place, as the research vessel was moored in the docks in Constanța harbor (Fig. 16).

6. EDUCATIONAL ACTIVITIES RELATED TO TDM

Two workshops for schools took place on the 25th of July 2014, after the arrival of *Magyarosaurus* home. They were jointly organized by the partners in the TDM project, which contributed with the materials and technical support, in collaboration with the Association of Women in Sântămărie Orlea. These workshops, involving participation of about 30 students from local schools, as well as teachers and family members, are described elsewhere (Seghedi and Andrășanu, in preparation).

On the 3rd of June 2017, a GeoEcoMar team organized a workshop entitled "Let's build a sauropod dinosaur" on board the floating lab Halmyris, moored on the Sfântu Gheorghe distributary of the Danube Delta at Uzlina. The participants, first and second grade children from schools in Mahmudia and Murighiol, worked for about 4 hours to create their own

Fig. 12. After crossing the Danube at Ilgani, the trailer with *Magyarosaurus* is preparing to park next to the Halmyris floating lab. Photo: Antoneta Seghedi.

Fig. 13. *Magyarosaurus*, arriving to GeoEcoMar headquarters in Constanța on the 22nd of July 2014 (left), and leaving the next day (right). Photo courtesy of Gabi Vlad.

Fig. 14. *Magyarosaurus*, parked in the yard of GeoEcoMar headquarters in Bucharest on 23rd of July 2014. Photo: Antoneta Seghedi.

Fig. 15. The trip in the Danube Delta, the final incentive of the Kickstarter project granted for Dieter Schlaffke, the baker who pledged the highest amount for the journey of *Magyarosaurus*. Photo: Silviu Rădan.

Fig. 16. Brian Cooley and Dieter Schlaffke visited R/V Mare Nigrum on the 8th of June 2017. Photo: Antoneta Seghedi.

dinosaur from wire, masking tape and plaster bandages. The scope of the workshop was to develop modeling and painting abilities while stimulating children's interest in the dwarf dinosaurs that lived in the Late Cretaceous on the Hațeg Island.

Prior to the children's arrival, the Canadian guests prepared the dinosaur skeletons, cutting the wires, modeling the limbs and fixing them to the skeleton with masking tape. Upon arrival, the children listened to a short presentation about the dwarf dinosaur *Magyarosaurus* and its journey, which took place in the multi-task room on the Halmyris floating laboratory. It was an interactive presentation, as children were asked various questions about dinosaurs. Only one boy from the 15 participants has heard about dwarf dinosaurs before, but all children had some knowledge about other dinosaurs.

Participants then went to the prow of Halmyris, where Brian Cooley instructed them how to use the wire skeletons to put flesh on their sculpture, using masking tape. After shaping the dinosaurs by fixing masking tape on the wire skeletons, wet plaster bandages were used to finish the dinosaur models (Fig. 17). Once finished, models were left to dry on the deck, in the sun. In the meantime, the children cleaned the tables used for modeling the dinosaurs and mopped the floors.

During the break taken after the first part of the workshop, six children dressed in traditional Ukrainian costumes performed Ukrainian and Romanian songs. Then everybody was treated with refreshments and delicious cakes made by Cristina Grigoriu who is working on Halmyris.

Once the break was over, the second part of the workshop was resumed on the front deck. This second part was about painting the dinosaurs. Every technique and utensils were used to paint: brushes, sponges, fingers (Fig. 18). After finishing their work, the children took a picture with Brian Cooley and their dinosaurs (Fig. 19).

This workshop was a most enjoyable experience for all people involved: Brian and Dieter, the two local teachers, the representatives of GeoEcoMar, including Leon and Cristina Grigoriu who are in charge with Halmyris, and of course the children, who took their dinosaurs home.

Pictures from the workshop were posted on the Facebook page of the TDM. Several quick time movies were shot by the third author of this paper, in order to be posted on youtube.

Exhibitions made by GeoEcoMar

In the fall of 2015, the exhibition "Brian Cooley – dinosaur art", dedicated to the work of Brian Cooley, was completed and sent to Hațeg. For this exhibition 50 photographic images provided by Brian Cooley, 15 pictures from the archive of Cameron Fern (a Canadian collaborator of Brian) and 15 pictures taken by Gheorghe Oaie in 2008 were used. The pictures were reproduced on matte paper format A3 and A4, while the largest image was printed as a 3/1.5 m banner. The images were framed with the sponsorship from Adaconi SRL from Hațeg. A power point presentation was prepared for the exhibition, together with two workshops (with guides for students and for teachers), a movie with *Magyarosaurus* in the Canadian Rockies shot for the Kikstarter project and films from youtube on Brian's work. A book on the dinosaur art of

Fig. 17. Activities from the workshop „Let's build a sauropod dinosaur" organized on the floating laboratory Halmyris of GeoEcoMar: fixing the masking tape (above) and fixing the plaster bandages to shape the sauropod body (below). Photos: Silviu Rădan.

Fig. 18. Various techniques used by children to paint their dinosaur models. Photos: Silviu Rădan.

Fig. 19. Group picture of the workshop participants with Brian Cooley and their dinosaurs (above), photo: Antoneta Seghedi. Children showing their finished sauropod models (below) Photos: Silviu Rădan.

Brian Cooley is in preparation. The exhibits are held in General Berthelot village, as the opening of this exhibition had to be postponed for May 2018 (Fig. 20).

For the travelling exhibition "Dwarf dinosaurs from Hațeg country", three modules were designed and prepared. The "Cretaceous life on Hațeg island" module consists of 43 original 2D reconstructions, specially created for the TDM by Polish geologist and paleoartist Jakub Kowalski. The reconstructions are black and white drawings in pencil, which were printed on A3 and A0 forex boards for the exhibition. The "Fossils in Cretaceous rocks from Hațeg basin" module consists of 10 wooden boxes with transparent lid, designed this way to contain fossil remains (mainly casts) of dwarf dinosaurs and other vertebrate fauna from the main fossil sites, like bones, teeth, unguals, osteoderms and egg shells. The boxes will be accompanied by larger posters representing ecosystem reconstructions. The third module, "The journey of a dwarf sauropod" is represented by a set of 60 images representing the journey of *Magyarosaurus* across Europe and Romania, with pictures provided by Brian Cooley and the authors of this paper. They are reproduced on panels featured in frames as a film succession, showing the main localities and places visited by *Magyarosaurus* on its way home. Promotional materials that will accompany the exhibition are T shirts, mugs and pins with images of *Magyarosaurus* and *Balaur*, posters, flyers, promotional brochures of GeoecoMar and a catalogue of the exhibition. Two workshops, one on *Balaur*,

Fig. 20. Posters of the two exhibitions created by GeoecoMar for the TDM. Exhibition „Brian Cooley – dinosaur art" (left) and „The dwarf dinosaurs of Hațeg island" (right).

the other on *Magyarosaurus*, quizes and questionnaires were also prepared for the exhibition.

7. CONCLUSIONS

NRDI GeoEcoMar is working towards an increased participation in educational and outreach activities. As such, the institute was involved lately in workshops for school children, temporary or travelling exhibitions, as well as in interpretation of one of the most valuable fossil fauna in Romania – the dwarf dinosaurs from the Hațeg basin. The institute supported the TDM project and contributed to the reconstructions in various ways, from logistic support, to sponsoring one of the reconstructions and the transportation of the largest dinosaur sculpture to Romania.

GeoEcoMar is strengthening its relationships with the Hațeg Global Geopark – University of Bucharest through involvement in new projects on geoconservation and promotion of the paleontological heritage of the Hațeg country. First, because dinosaurs are ideal ambassadors to make children understand the principles of geology and enjoy paleontology. Then, because geological sciences cannot be appreciated if elementary knowledge of geology is lacking. We are living on a dynamic planet constantly reminding us that we cannot control its natural geological processes. Ignorance of fundamental geological processes that make this planet work can cost us life and property loss. Through the TDM project, GeoEcoMar can get better involved in promotion of earth sciences, publishing books and brochures on geological subjects. It is necessary that the extremely specialized geological language to be translated so that it can be understood by people of all ages outside the geological community. This way, in the long run, we can hope to contribute to geological literacy of Romanian people, to increase people's awareness on the values of the geological heritage and the necessity to protect the natural environment. And last, but not least, to attract young people to study this extraordinary science, the science about how this planet works, and how geological processes shaped the evolution of life on this planet, including ours.

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