Chapter 11
CHEMNITZ: Back to the Roots of Palaeobotany—Chemnitz and its Palaeontological Collection

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11.1 General Information

The foundation of the museum can be traced back to 1859, when Chemnitz was a rapidly developing and increasing industrial centre in Saxony. However, contrary to its economic importance, science and culture were hardly represented in the city's public life. In Chemnitz, neither a patriarchal university nor scientific libraries as intellectual centres were present at that time. In 1859, 16 committed citizens founded a reader circle of technical literature—the precursor of the later Natural History Society, which not only invited for both lectures and excursions but also published its own scientific series. Speakers and authors were the members of this circle themselves, among them teachers, medical practitioners, scientists, traders and businessmen (Barthel 2001; Kogan 2016). Because of the rapidly growing collections, in 1864 the society felt impelled to offer them to the city. Only in 1868 the City of Chemnitz accepted the donation of the natural history collections and associated scientific library and, hence laid the cornerstone of today's Museum für Naturkunde. Conditions of the donation contract included on the one hand the continuation of scientific assistance by society members, on the other hand the request to make the collections accessible to the public. The latter was achieved not before 1875. Thanks to manifold activities of the society members and the considerable voluntary services provided by honorary custodians in particular, several collections were established. Among them was an outstanding collection of fossils. Depending

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on donations and the scientific work of society members, the main focus was directed at Permo-Carboniferous floras. Based on the petrified woods from Chemnitz (Fig. 11.1), an exchange developed even among other petrified forest sites in the world. The acquisition of new objects happened permanently per purchase, in former times, e.g., from the well reputed company Krantz in Bonn or with acceptable gifts from friendly local collectors.

Today the palaeontological collection consists of ca. 27,000 items and is focused primarily on fossil material that recorded the evolution and preservation of terrestrial ecosystems with special emphasis on volcanic environments and petrified wood (Rößler 2001; Rößler et al. 2006, 2014a). A further accent is being targeted on the local to regional Earth history or famous fossil sites in Germany. It is subdivided into several parts with different importance and linkage to active research.

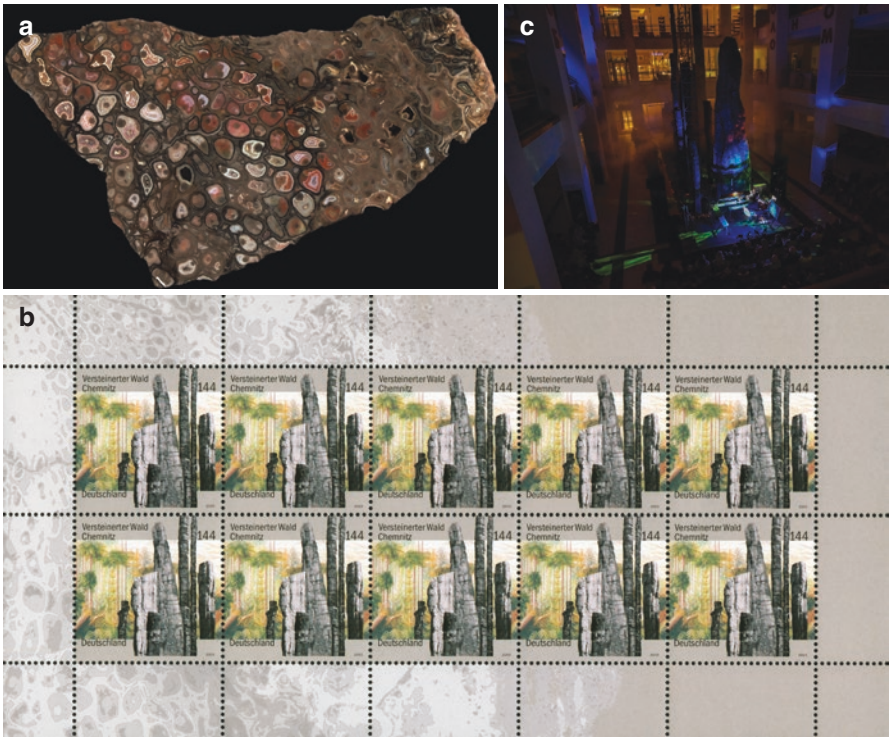

Fig. 11.1 The Petrified Forest of Chemnitz: (**a**) Roots of a *Psaronius* tree fern filled with colourful agate explaining that the original purpose of petrified wood from Chemnitz was to provide jewellery materials in the mid eighteenth century, 80 × 150 mm, K4984b. (**b**) Special issue stamp highlighting the Chemnitz Fossil Forest, design: Joachim Ries. (**c**) The world's only petrified forest with its own music. Release concert of the album 'Petrified Forest' created by Wellenvorm, Museum für Naturkunde Chemnitz, 2017, photo: Mike Flemming

11.2 Historical Development of Collecting and Conservation—Source and Result of Knowledge

The palaeontological collection of the Museum für Naturkunde Chemnitz comprises the petrified wood collection and the fossil collection. The following paragraphs give an overview of their genesis and consideration in recent research and educational programmes.

11.2.1 The Petrified Wood Collection

The Petrified wood collection comprises ca. 7000 catalogued specimens (labelled K or KH with serial number), from 20 gram to 12.5 tons weight, and represents an exceptional set of anatomically preserved plant fossils from different geological eras (Fig. 11.2). Most valuable objects are among the type material and published/figured specimens by Carl Bernhard von Cotta (1808–1879), Heinrich Robert Göppert (1800–1884), Karl Gustav Stenzel (1826–1905), Johann Traugott Sterzel (1841–1914), Hermann Count Solms-Laubach (1842–1915), August Schenk (1815–1891), Otto Weber (1858–1910), Birbal Sahni (1891–1949), Manfred Barthel (geb. 1934), and Ronny Rößler (geb. 1965). For any references to historical literature we refer to the bibliography provided in Rößler (2001).

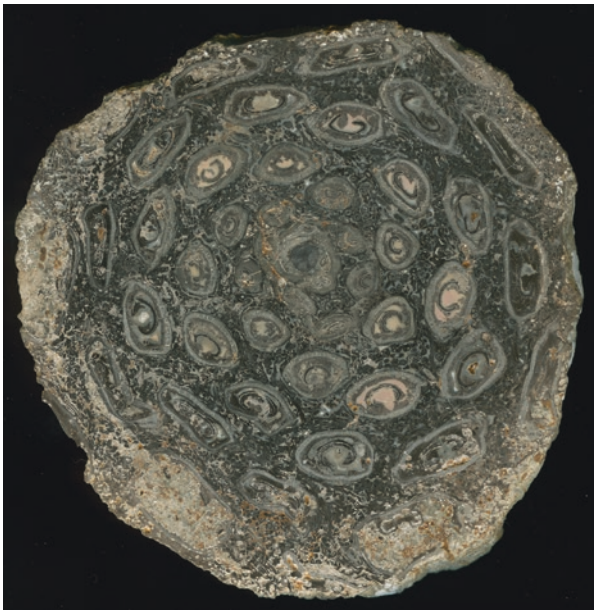

Fig. 11.2 *Tubicaulis solenites* (Sprengel 1828) Cotta 1832, transverse section of a unique tree fern, Bolsovian of the Flöha Basin, SE-Germany, diameter 116 mm, K4798

11.2.1.1 Chemnitz—The Permian Pompeii

The majority represents findings from the Chemnitz Fossil Forest, that have been collected since 1740 but further enlargement is continuing today from ongoing excavations. First mentioned by Georgius Agricola (1494–1555), mayor of Chemnitz, the term "fossil" was derived from the Latin "fossilis" that means "excavated from the soil". The "forest of stone" moved into the centre of interest especially between 1740 and 1750 when larger specimens of petrified woods were being discovered. In the service of the Saxon elector, the mineralogist and gemstone inspector David Frenzel (1691–1772) had come across the occurrences of the "petrified forest" when prospecting for gemstones. Knowledge of the occurrence spread quickly, and collections such as the Cabinet of Naturalia at Waldenburg/Saxony still bear testimony to the collector's diligence by means of the exhibits collected around the middle of the eighteenth century. Among the earliest finds are also specimens collected and labelled by the pharmacist Hermann Ottomar Leuckart (1818–1902). The large precious collection of the pastor Gottfried Hermann Schreckenbach (1807–1875) was acquired after his death in 1875. About 5000 objects, among them 480 petrified woods and rare palaeobotanical literature considerably enriched the museum's collection (Barthel 2001).

What makes the Chemnitz Fossil Lagerstätte so special in comparison to other fossil forests with tree stumps preserved *in situ* is both its historical and geological importance. Collecting at this site dates back to the early eighteenth century and many collections worldwide house exhibition-quality specimens from the Chemnitz Fossil Forest (Urban 1980). Specimens from this site provided the basis for introduction of fossil plant names reaching back to the early days of palaeobotany. Several genera of common late Paleozoic plants were first described from Chemnitz, the type locality of *Psaronius, Calamitea*, and *Medullosa*. In Chemnitz, an early Permian landscape was buried instantaneously by volcanic ashes and flow deposits preserving outstanding fossil assemblages and many trees in their places of growth. Eruptions in the area of present-day Chemnitz resulted in the formation of a pyroclastic sequence referred to as the Zeisigwald Tuff of the upper Leukersdorf Formation. By the use of U-Pb measurements on zircons the age was constrained to 290.6 ± 1.8 Ma.

During residential building in the late nineteenth and early twentieth centuries the petrified wood collection grew again noticeably. During that time J.T. Sterzel was much supported by local people such as the private collector O. Weber, the builder Max Güldner and the land owner August Orth. Part of the collection are additionally ca. 300 thin sections privately ordered and paid by O. Weber concerning his studies on medullosans, containing many figured specimens of Weber and Sterzel (1896) and being still available for investigation (Fig. 11.3).

Fortunately during World War II only few objects of the palaeontological collection may have gone lost or were destroyed, even the valuable palaeobotanical library survived the tremendous fire following the Anglo-American air raid of 5th of February in 1945, which destroyed vast parts of the city.

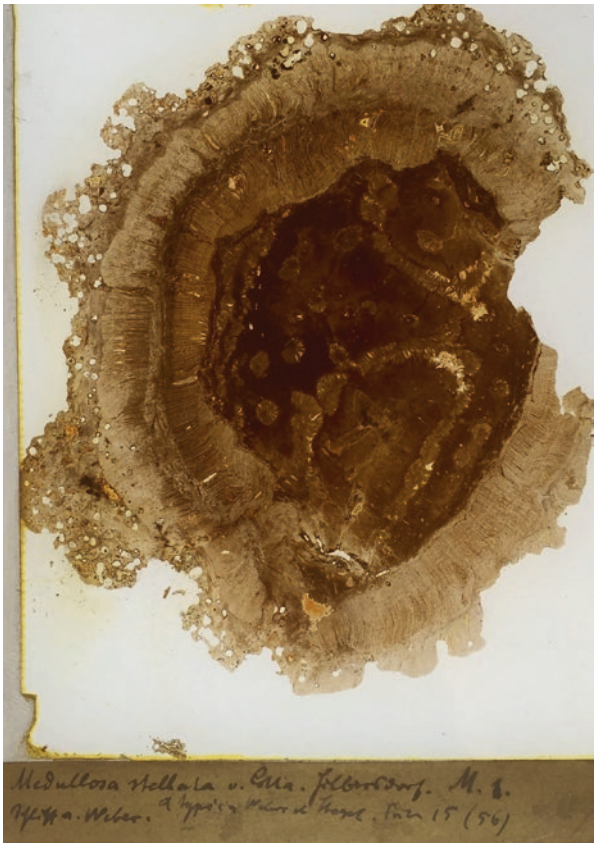

Fig. 11.3 *Medullosa stellata* (Cotta 1832) Weber et Sterzel 1896, historical transverse thin section from the holotype, Permian of Chemnitz, 80 × 110 mm, K3004-DS

Since the 1970s new specimens have been recovered during construction work, but all of them were unintentional, because most of the fossil forest has been developed into an urban area. Since collections are not ultimate items, their permanent enlargement is an essential process on the way to gain knowledge. Scientific excavations offer a wide field of activity, as the successful examples in Chemnitz show. Between 2008 and 2011, a scientific excavation at Chemnitz-Hilbersdorf delivered for the first time a more complete insight into a local taphocoenosis of this fossil forest (Fig. 11.4a). A huge amount of data was gathered offering potential for a detailed, albeit spatially confined, reconstruction of this ancient forest habitat (Rößler et al. 2012a, 2015). The fossil record comprises a comprehensive spectrum of plant and animal remains, more complete than ever documented before (Figs. 11.4b, c–11.6). Upright-standing petrified trees, still anchored in the original substrate, were discovered together with a variety of parautochthonously embedded stems and twigs (Luthardt and Rößler 2017). A countless number of leaf adpressions and moulds were found preserved in one single horizon next to various arthro-

Fig. 11.4 The first scientific excavation of the Museum für Naturkunde—the key to third-party funds and current research: (**a**) Excavation Chemnitz-Hilbersdorf (2008–2011). (**b**) *Ascendonanus nestleri* Spindler et al. 2018, first arboreal pelycosaur (Synapsida: Varanopidae) from the Chemnitz Fossil Lagerstätte, early Permian, length 174 mm, TA1045. (**c**) *Opsieobuthus tungeri* Dunlop et al. 2016, first scorpion find from the Permian, Chemnitz Fossil Lagerstätte, TA1126

pod remains or reptile and amphibian skeletons exhibiting even their former body outlines (Dunlop and Rößler 2013; Feng et al. 2014; Dunlop et al. 2016; Luthardt et al. 2016). Within a distance of approximately 2 km from the aforementioned locality, a second excavation site in Chemnitz-Sonnenberg was initiated in 2009 and finally set up in 2014 (Fig. 11.7). We aim to continue this excavation during the next years to verify the knowledge about the fossil forest ecosystem, especially regarding plant and animal diversity and spatial distribution, variation of site-specific environmental characteristics within a wider area and taphonomic differences correlated with different distances from the volcano.

Fig. 11.5 Ecological reconstruction of *O. tungeri* placed in its suggested original environment at the mouth of a burrow among woody roots on the forest floor. Drawing: Frederik Spindler

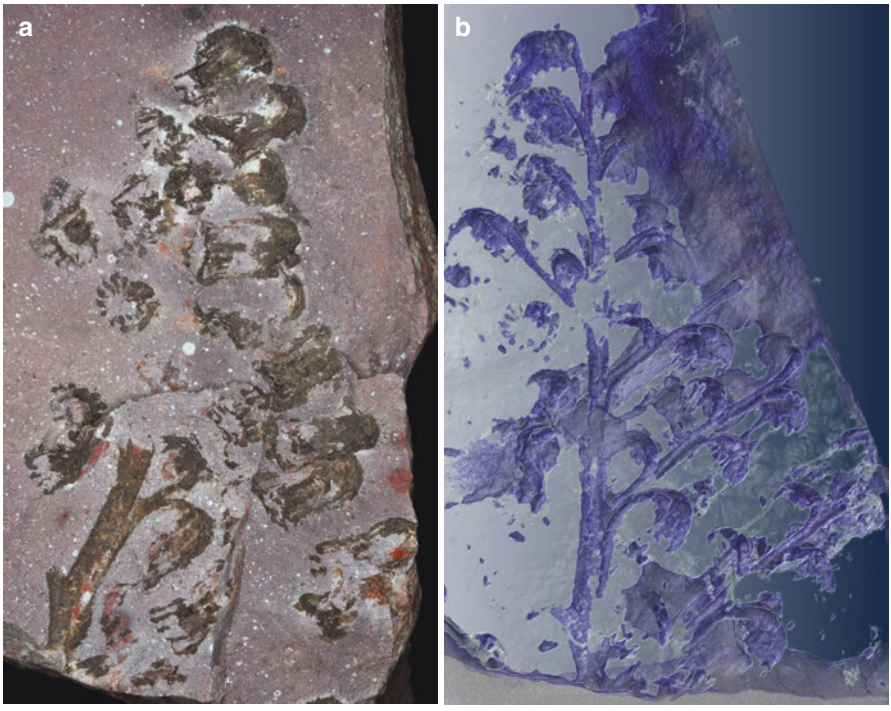

Fig. 11.6 *Sterzelitheca chemnitzensis* Feng et Roessler 2014: (**a**) Bipinnate pinna carrying seed fern pollen organs, Chemnitz-Hilbersdorf, length 72 mm, TA0201. (**b**) CT image illustrating detail of *Sterzelitheca chemnitzensis*

Fig. 11.7 Excavation Chemnitz-Sonnenberg—open air exhibition and privileged place for various educational programs, 2016, photo: Mike Flemming

11.2.1.2 Petrified Wood—Delicate Cell Preservation from Deep Time

The Petrified wood collection additionally comprises fossil woods from many meanwhile inaccessible sites from continents all over the world including Antarctica concerning geological systems from the Devonian up to the Quaternary. Among them are historical items, donations, purchased collections or single objects up to own finds from different geological sections and taphonomically diverse settings. Of particular interest are objects exhibiting different minerals involved in the petrifaction or permineralisation of wood (SiO_2, CaF_2, Carbonates, Fe-oxides, Fe-sulphides) or woods of different botanical affiliation (pteridophytes, gymnosperms, angiosperms).

In 1907, a collection of 127 thin sections of anatomically preserved coal ball plants from the Pennsylvanian of the British Coal Measures was bought from the geologist James Lomax, England. Since these excellent preparations recently offered the chance to recognise diverse forms of fungal microorganisms interacting with the plants tissues or recycling them, the thin sections will remain of future interest.

Collection material that has also been the basis of one decade of joint research, and therefore including several holotypes, originate from the Permian fossil forest of the Parnaíba Basin in NE Brazil (Rößler and Galtier 2002a, b, 2003; Dias-Brito et al. 2007; Kurzawe et al. 2013; Rößler 2014; Rößler et al. 2014b; Tavares et al.

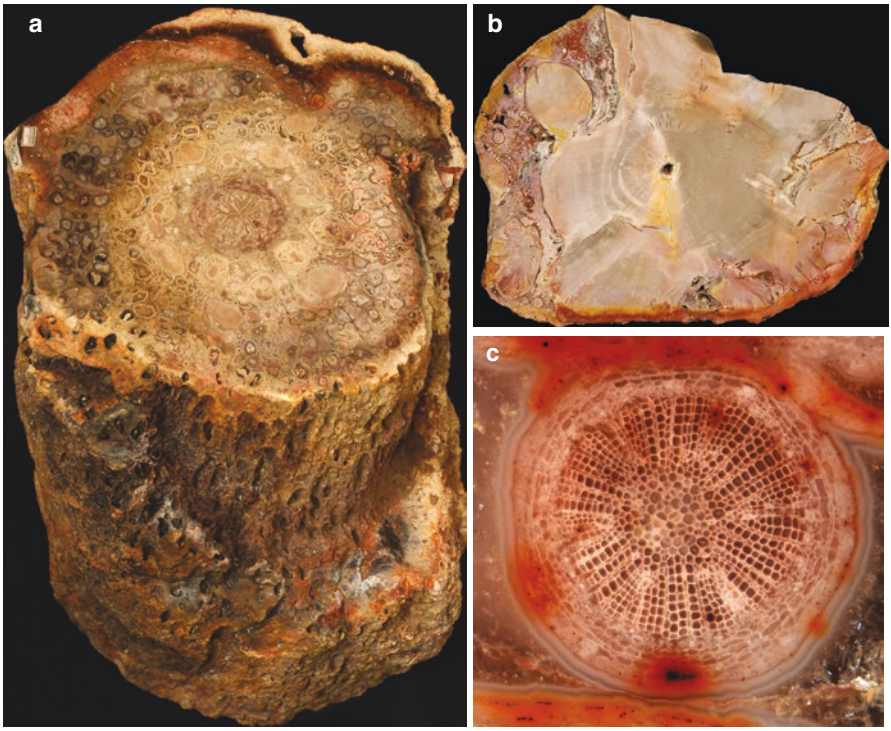

Fig. 11.8 Anatomically preserved plants: (**a**) *Dernbachia brasiliensis* Rößler et Galtier 2002, tree fern stem from the Permian of the Parnaíba Basin, NE Brazil, K5782. (**b**) Calamite stem of the *Arthropitys* type, transverse segment showing attached roots, Permian of the Parnaíba Basin, NE Brazil, 330 × 430 mm, K5258. (**c**) *Astromyelon*-type root with polyarch stele consisting of central pith, surrounding primary and secondary xylem and extraxylary (phloem?) tissue, Permian of the Parnaíba Basin, NE Brazil, diameter 1.6 mm, K5486

2014; Neregato et al. 2015, 2017). After professional preparation the citizen scientist Robert Noll provided the main part of this anatomically preserved fossil material (Fig. 11.8).

11.2.2 The Fossil Collection—Remains of Plants, Animals and Biosedimentary Structures

The fossil collection of the museum consists of ca. 20,000 catalogued specimens (labelled F or TA with serial number) arranged in geographic and stratigraphic order from the Precambrian up to the Quaternary. Emphases are classical fossil lagerstätten, such as Solnhofen, Holzmaden, Frankonian Jurassic, Copper Slate, Silurian of Thuringia, Cretaceous of Saxony and Rügen Island, Baltic Amber (Fig. 11.9a).

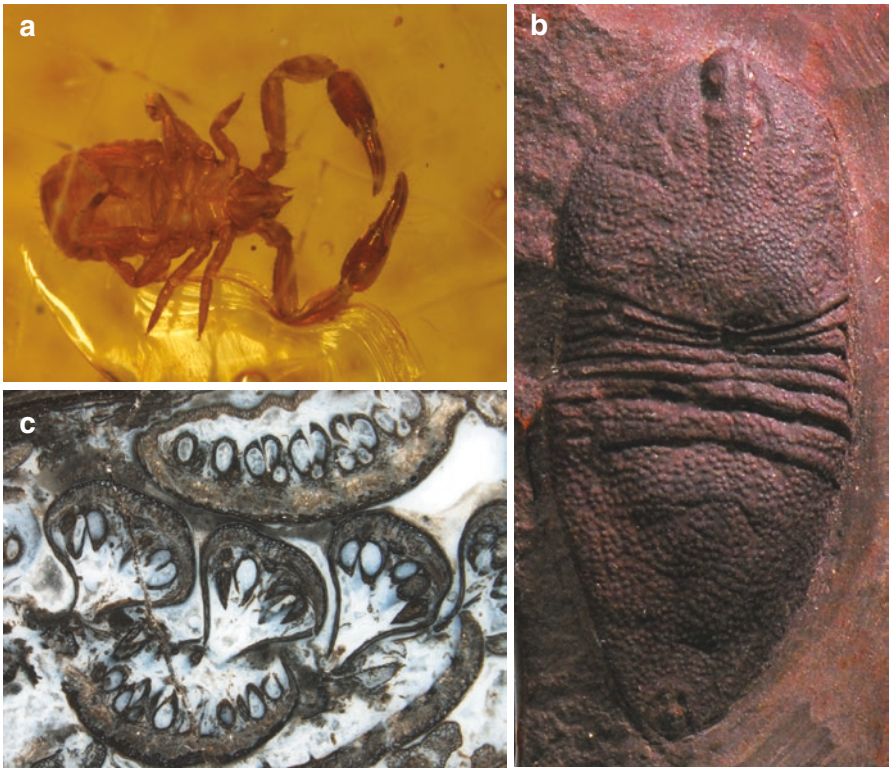

Fig. 11.9 Collection specimens in different preservational forms: (**a**) Pseudoscorpion in amber, Eocene of the Baltic, Russia, length of the animal 3.7 mm, F11933. (**b**) *Pycnotarbus verrucosus* Daber 1990, imprint of a phalangiotarbid arachnid, Asturian Coal Measures of Oelsnitz, SE Germany, 11 × 25.5 mm, F15184a. (**c**) Chert with anatomically preserved *Scolecopteris* pinnules, early Permian of Sardinia, Italy, 4.7 × 6.2 mm, F15368

Centrepiece of this collection is a number of local collections from Carboniferous and Permian sedimentary basins of Germany, Bohemia, Spain, USA and Russia including the largest collections of both the terrestrial Mississippian of Chemnitz and the Pennsylvanian of Zwickau-Lugau-Oelsnitz (Fig. 11.9b). Type material or figured specimens resulted from publications of Hanns Bruno Geinitz, J.T. Sterzel, Walter Gothan, Wolfgang Hartung, Georg Mayas, Friedrich Nindel, Rudolf Daber, Manfred Barthel, Jürgen Meyer, and R. Rößler.

Further part is the collection of fossiliferous cherts (except from Chemnitz-Altendorf that are traditionally included in the petrified wood collection), mainly from the Pennsylvanian and Permian of Germany (Freital, Zwickau, Donnersberg, NW Saxony), but also from other sites and times worldwide, such as Rhynie, Sardinia and Brazil (Fig. 11.9c).

Sizeable stromatolites of different ages from the Precambrian up to the Neogene add to this collection (Fig. 11.10). Among them are classical sites, such as

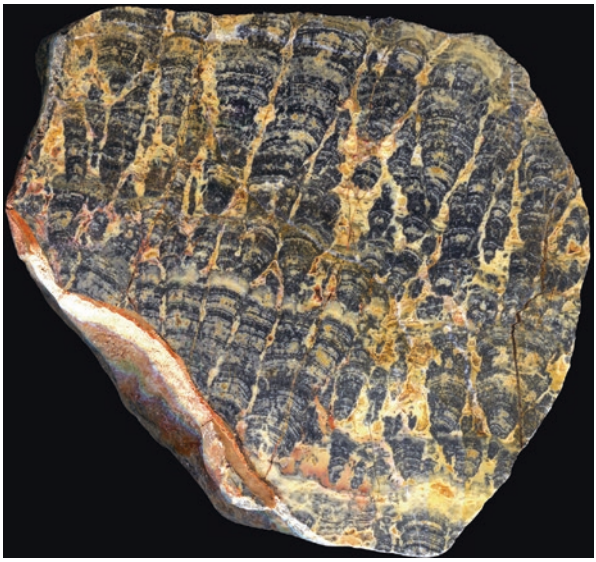

Fig. 11.10 Stromatolite representing the oldest known biota on Earth, Precambrian of Warrawoona, W-Australia, 165 × 178 mm, F13904

Warrawoona/Australia, Minnesota/USA, or Hebei Province/China (Precambrian), but also occurrences in Germany, such as the Saar Nahe and Thuringian Forest basins (Permian) or the Mainz Basin (Neogene).

11.2.3 Staff, Edificial Infrastructure and Perspectives

The staff concerned with geoscientific projects consists of: one curator (geoecologist/biologist), one geologist/palaeontologist and one geotechnician both from funded projects, one scientific volunteer (geologist/palaeontologist), one geological preparator, and the museum director (geologist/palaeontologist).

The infrastructure comprises study rooms, collections, offices, the natural science museum library and laboratories (several are external) for sectioning/grinding/polishing, thin sectioning, transmitted/reflected light-microscopy, macro- and microphotography (Figs. 11.11 and 11.12).

Besides temporary exhibition the museum is providing the following permanent exhibitions: (1) petrified forest, (2) Sterzeleanum, (3) Insektarium, (4) excavation "window to the past".

Financial support for the work in and with the collection, basic educational programmes and for exhibitions is provided by the City of Chemnitz and the Free State of Saxony. Research activities and special educational programmes as well as acquisition are based on the contribution by third-party funds such as Deutsche Forschungsgemeinschaft, Volkswagen Foundation, and the registered association "Freundeskreis des Museums für Naturkunde Chemnitz e. V." (founded in 1996). In

Fig. 11.11 Laboratory facilities at the Palaeobotanical Research Centre (PRC) of the Museum für Naturkunde Chemnitz, 2017

Fig. 11.12 View into the Palaeontological Collection of the Museum für Naturkunde Chemnitz, 2017

addition to that the museum's research activities rely heavily on the collaboration with other research institutions and companies providing special analytical facilities.

Future activities focus first on collection-oriented research and their translation into a new contemporary and modern permanent exhibition that complies with the growing demand for science communication and second on the consequent development of the permanent excavation area "window to the past".

11.3 Research—Key to the Past and Future

11.3.1 Development of Research Items

The development of the collections has been closely related to research and associated international cooperation (Fig. 11.13). Already in the nineteenth century scientists from several universities and museums had come to study fossil woods from Chemnitz. Among them were the botanists Franz Unger from Graz, August Corda from Prague and several decades H.R. Göppert from Breslau with his scholar Carl Gustav Stenzel working on gymnosperms and tree ferns. August Schenk, working at Leipzig University, was particularly interested in medullosans. H. Count Solms-Laubach from Strasbourg was working on tree ferns and medullosans. At the beginning of the twentieth century, Paul Bertrand from Lille was interested in the rare ferns from both Chemnitz and Flöha, as the palaeobotanist Birbal Sahni from Lucknow/India did. Finally, Rudolf Florin from Stockholm was working on the plant fossils from the Altendorf Chert, which already attracted H.B. Geinitz from Dresden from 1872 onward. End of the nineteenth century J.T. Sterzel got diverse petrified woods from Domenico Lovisato (1842–1916) geologist at Cagliari, Sardinia, Italy, for research (Fig. 11.14) and published on Oligocene palms (Sterzel 1900).

In the second half of the twentieth century research based on the palaeontological collection of Chemnitz was exclusively done by visiting scientists from other institutions working on floral monographs (Manfred Barthel), fossil-rich sites (Klaus-Ulrich Leistikow, Jörg W. Schneider,) or new finds (Ralf Werneburg).

Present-day research focuses on the museum vision and pervading the other keystones of a museum, such as conservation, collection, exhibition and education. Based on the historically evolved collections and related activities, since 1995 the museums' collection and research conceptions address traditional fields again, such as the occurrence, formation, fossil record, and palaeoecology of petrified forests, particularly those from Carboniferous and Permian times, and systematics, taphonomy and evolution of Paleozoic arthropods as well (Dietrich et al. 2013; Rößler et al. 2003; Dunlop et al. 2016).

Thus studying historical and recent exhibits to provide any additional insights for the understanding and maintaining of life on our planet makes up our mission. Therefore we are certain that historical collections are not ultimate but anxious for consequent enhancement and new scientific interpretation. Our recent excavations

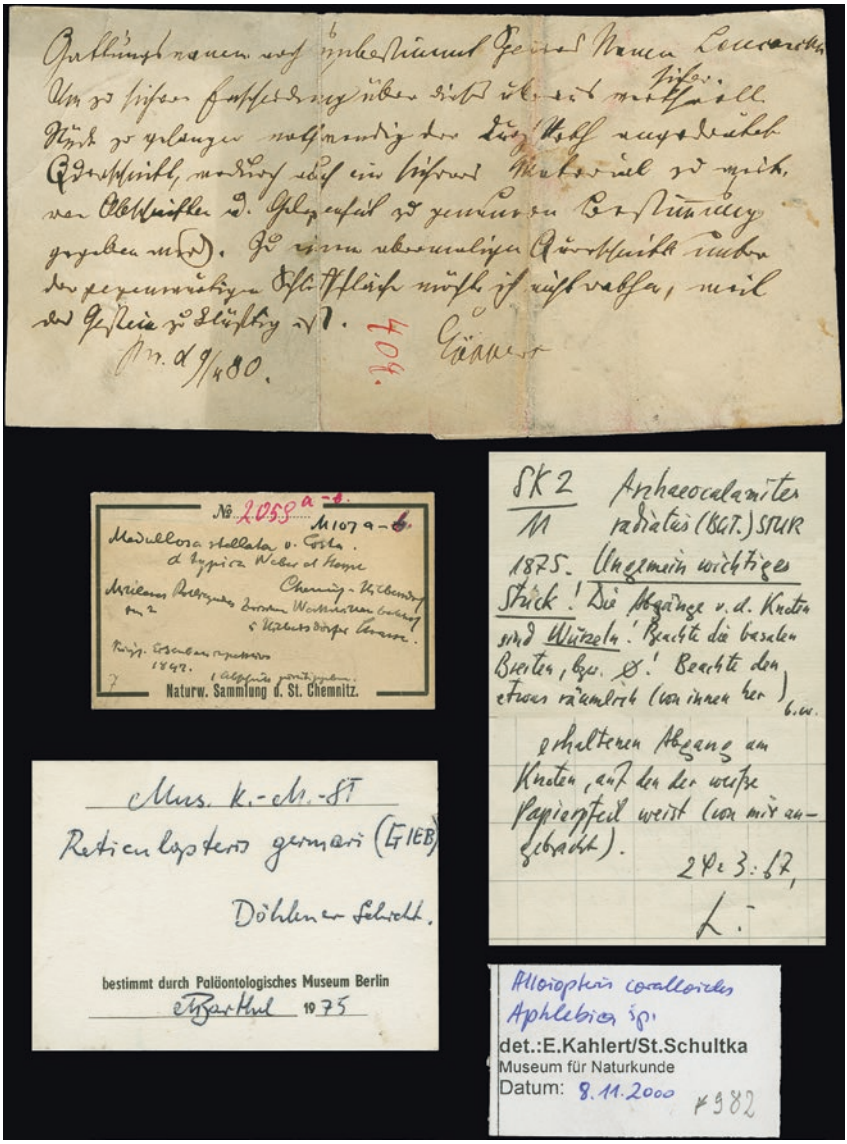

Fig. 11.13 Collection labels documenting three centuries of research by curators or visiting scientists (Heinrich Robert Göppert: 1880, Johann Traugott Sterzel: 1897, Klaus-Ulrich Leistikow: 1967, Manfred Barthel: 1975, Eberhard Kahlert und Stephan Schultka: 2000)

within the area of the city provide an excellent connection between historical collections and pioneering research. As expected for a museum, the professionals are faced with the public in their daily work. In talks, events and guided tours they present first-hand knowledge and have the opportunity to answer the visitors' questions experiencing their advice, suggestions and perspectives (Rößler and Zierold 2016).

Fig. 11.14 *Palmoxylon lovisatoi* Sterzel 1900, anatomically preserved palm stem named in honour of Domenico Lovisato, Oligocene of Sardinia, Italy, 94 × 112 mm, F7556a

11.3.2 Present-Day Research: From Front-Door to International Networking

Interdisciplinary networking is required to address the issues of the complex Chemnitz Fossil Lagerstätte. On this account we are highly interested to maintain and strengthen our research communication. Thus we are able to solicit third-party funds by means of our research outcomes. However, the Museum für Naturkunde not only collaborates with international scientists but also emphasises the cooperation with universities and other educational institutions to work along in "Jugend forscht" projects or academic qualification studies.

Research networks enable us to communicate irrespective of borders, to accelerate the achievements via divided responsibilities and to increase the impact of publications in peer-reviewed journals.

With the initiative of the Volkswagen Foundation "Forschung in Museen" we obtained the opportunity for our research project "The Petrified Forest of Chemnitz—Snapshot picture of a Permian ecosystem preserved by explosive volcanism". The

prosperous outcome enabled us to allocate state of the art palaeontological research at the museum which was highly appreciated by the scientific community. In addition to that they provide the fundament for educational programmes and the scheduled revision of the permanent exhibition.

Derived from the collection resources and the scientific experience of our staff we are focusing on the following research topics:

- Systematics, morphology, anatomy, and ecology of late Paleozoic plants (Rößler 2000; Rößler and Noll 2006, 2007; Rößler et al. 2012b)
- Systematics, evolution, ecology and taphonomy of late Paleozoic arthropods (Rößler and Schneider 1997; Dunlop and Rößler 2013; Dunlop et al. 2016)
- Volcanic influenced palaeoecosystems and their role in the evolution of organisms (Rößler et al. 2012a)
- Volcanic taphonomy and *in situ* preservation of plants and animals (T^0 assemblages) (Werneburg 1993; Rößler et al. 2012a; Löcse et al. 2013)
- Pathways of silicification and anatomical preservation of plants, formation of cherts (Nestler et al. 2003; Witke et al. 2004; Matysova et al. 2010; Dietrich et al. 2013)
- Environmental analysis of Permocarboniferous fossil forests (Rößler 2006)
- Palaeoclimatology of late Paleozoic terrestrial ecosystems (Luthardt et al. 2016)
- The significance of natural data archives (Luthardt and Rößler 2017)
- Geological development and stratigraphy of the Chemnitz Region (Rößler et al. 2015)

The following research and citizen science projects contribute to the scientific output of the museum:

- Analysis of an early Permian forest ecosystem preserved in situ by volcanism (Chemnitz Basin, SE Germany)
- Dynamics of Pennsylvanian basin margin to upland environments—a case study from Stephanian fluvial deposits of the Kyffhäuser Mountains (Saale Basin, Central Germany)
- Investigating a volcano-sedimentary complex of the mid-European Variscids (Pennsylvanian, Flöha Basin, SE Germany)
- Palaeoecological and palaeogeographic significance of low latitude palaeofloras of Gondwana (Permian, Parnaíba Basin, NE Brazil)
- A Permian key occurrence offering new perspectives to understand/reconstruct the interaction of climate, environment, ecology and taphonomy (Manebach Formation, Thuringia, East Germany)

Both the research grant by the Deutsche Forschungsgemeinschaft as well as the integration into academic teaching at the TU Bergakademie Freiberg promotes the ongoing research at the museum. Volunteers, students and doctoral students enhance the museum's work, imply innovations and regain experience from their hosts. As universities welcome contributions of external lecturers at no charge, cooperation

with museums provides various opportunities to achieve research funds, collaborate in projects or to unlock treasures in collections.

Together with Lutz Kunzmann, Senckenberg Dresden, Ronny Rößler has continuously offered the lecture Palaeobotany as a visiting Professor at the Geological Institute of TU Bergakademie Freiberg since 1995. As part of the module "Evolution of organisms" the lectures, seminars and excursions are mandatory for M.Sc. students in geology/palaeontology but additionally open to international master programmes and studium generale (http://tu-freiberg.de/geo/palaeo/lehre).

The Museum für Naturkunde Chemnitz plays an integral role in developing the field of volcanic taphonomy by participating and hosting the year's International Workshop on Plant Taphonomy. Processes responsible for the integration of any plant or plant part into the fossil record are picked out by various talks and discussions. Deciphering taphonomic processes helps to understand how and what biological and geological information have been lost, as well as how a fossil plant assemblage differs from the plant community in the original environment.

In difference to universities one important task of museums is to communicate science with the public. This is realised not only by exhibitions and educational programmes but also in publications for broader audience's understanding. Therefore the museum publishes its own scientific series "Veröffentlichungen des Museums für Naturkunde Chemnitz" that appears annually. With that medium we encourage both professionals and amateur scientists to present their studies to a broad public. The museum tasks are closely related to collaborations with citizen scientists and amateur palaeontologists. They are incorporated in the work process of the museum, have access to research facilities and appreciate the scientific discussion, thus providing a win-win-situation for both. Often partnerships result in dedication to the scientific excavation, in sponsorship or even the donation of private collections.

Communication and outreach activities incorporate also workshops and conferences. Between 2002 and 2015, the museum housed an annual workshop enlightening fossiliferous cherts and their formation (www.kieseltorf.de). Despite the sometimes excellent preservation of cellular detail, cherts do not always get the attention they deserve because they are most often found as displaced fragments, pebbles, and boulders. The workshop developed into a discussion platform of both professional and amateur palaeontologists from Germany and bordering countries.

11.4 Didactic Conceptions, Public Engagement and Educational Work

The Museum für Naturkunde is located in the city centre of Chemnitz in the cultural centre, Tietz. Originally opened in 1913 as one of the most distinguished shopping centres, nowadays the building houses the adult education centre, the Museum für

Naturkunde, the city library, an art gallery as well as little shops. Visitors of the building are welcomed by the Petrified Forest exhibition which is open to the public. Entering the exhibition area of the "Sterzeleanum" our visitor will gain insights into the thrilling history of the area of todays Chemnitz. Animations of a volcano, immense touchable exhibits, podcasts and bilingual panels (German and English) ensure an entertaining as well as educational stay.

The exhibition, Insektarium is anything but dead. Visitors can watch living leaf-cutter ants at their diligent work, observe the busy honey bees in their crystalline hive and enjoy the opportunity to get a close look at living tarantulas, scorpions, millipeds and crabs, which—together with the insects—make up the arthropods, the largest animal group on Earth. The beauty of the shiny butterflies and the many different kinds of well hidden ghost insects will mesmerise the viewer. Beside this the exhibition explains the evolutionary backgrounds of arthropods.

Our special exhibitions provide a platform for current issues and virulent topics and are both challenge and opportunity. They request the ability to take the broader view beyond once subject of research and communicate science to a broad public. The connecting element between each of the special exhibitions is our urge to unhide the precious fossils of the collection, to interpret new scientific research outcomes and to engage young people. Within the last 10 years the museum can look back to projects with kids, students and contemporary artists such as:

- Im Extremen zu Hause (Zierold 2014)
- News from the Permian—international contemporary jewellery and the Petrified Forest Chemnitz (Museum für Naturkunde 2013)

Temporary exhibitions also based on the collaboration with citizen scientists. The following selections of exhibitions illustrate a remarkable documented evidence:

- Vulkanische Pflanzen vom Donnersberg (2014)
- Vom Zufallsfund zur Rarität—die Rätsel eines 310 Millionen Jahre alten Mosaiksteins aus der Evolution der Farne (Löcse et al. 2015)
- Rock Fossils—Ja, es ist Liebe (2016/17)

Work study associations are an instrument for ensuring a reservoir of young skilled labour (Kutloch and Zierold 2012). Instructed by museum specialists the kids are involved in collection related work, trained in systematics and thus inhale the atmosphere behind the curtain. Often the youth stay connected with the museum. The federal volunteer service and the voluntary ecological year are great opportunities in gathering first work experience and to prepare for university studies.

The outreach of the museum includes not only public preparations of vertebrates, social media and website activities, Radio and TV presentations but also the participation in Science Slams. Within the last few years three museum specialists talking about their research won this competition.

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