ACTA ACADEMIAE ARTIUM VILNENSIS / 22 2001

THE AMBER COLLECTION OF THE MUSEUM OF THE EARTH, POLISH ACADEMY OF SCIENCES, AS A SOURCE OF MULTIDISCIPLINARY RESEARCH (IN COMMEMORATION OF THE COLLECTION'S 50TH ANNIVERSARY)

Barbara Kosmowska-Ceranowicz,
Katarzyna Kwiatkowska,
Alicja Pielińska
Museum of the Earth, Warsaw (Poland)

The Amber Department, originally known as the Amber Unit, came into being at Warsaw's Museum of the Earth in 1951. The collection was founded by the ethnographer and keen traveller Adam Chętnik. Born in the Kurpie region, in the Narew river-basin, his interests concentrated on the traditions of extracting and working amber, which, in this part of the country, dated back nearly 200 years. Chętnik planned to accumulate a variety of materials which could be used as the basis for research in a number of disciplines. He also intended to amass a collection of specimens for exhibition purposes in order to popularise the subject of amber. By 1954 he had already prepared a manuscript on the amber collections held at museums throughout Poland. He achieved this with the help of a questionnaire which he took to approximately 70 museums and other institutions, where he compiled an inventory both of the raw material and artefacts in their possession (Kosmowska-Ceranowicz & Popiołek 1981).

During the period from 1951 to 1958, as head of the Amber Department, Chętnik, in collaboration with Zofia Zalewska, organised the first exhibitions on amber (Kosmowska-Ceranowicz 1982), acquiring in the process (primarily through purchases) a collection numbering around 3000 items. A number of gifts were also added to the collection during this period including that donated by Father Bruno Rieband in 1957, consisting of about 250 amber specimens containing organic inclusions, which proved to be part of Gdańsk's historic amber collection — of Westpreussische Provinzial Museum in Danzig. A similar gift was received in the 1980s from Antoni Marylski (Kosmowska-Ceranowicz 2001a). In 1954 the University of Wrocław gave the Museum of the Earth 34 pieces (of modest value) belonging to the late Goeppert collection (Pielińska 2001a).

The collection continued to acquire further research material under the curatorship of Z. Zalewska up until 1974. At this time the first reports on faunal inclusions, exhibition catalogues and a geological paper on amber deposits also appeared (Zalewska 1974a). 1961 saw the publication of a very significant work, compiled by Hanna Czeczott, on the flora found in Baltic amber, which is widely referred to in world literature.

By the end of 1974 the Museum's collection comprised nearly 8500 items and proved to have enough material to carry out research on a broad scale, encompassing the fields of palaeontology, geology and history (cf. Kosmowska-Ceranowicz 1993, 1994). The annual interdisciplinary meetings held at the Museum of the Earth since 1978, which bring together amber experts from both Poland and abroad, have become a forum not only for presenting the latest research results, but also a source of inspiration for a variety of new initiatives, such as participation in and co-organisation of symposia and seminars, as well as the mounting of temporary exhibitions throughout the country (from 1978 up until the present day these have taken place in 53 towns) and abroad (in 1977–1998 exhibitions, either

individual or co-hosted, visited 18 towns). Foreign collaboration is by no means limited to exhibitions — many museums (e.g. Ribnitz-Damgarten, Lvov, Göttingen) make use of the assistance of staff from the Amber Department in identifying and documenting amber collections.

At the end of January 2001 the last item to be entered on the Amber Department's inventory books was given the number 23926.

The entire amber collection is currently divided into the following categories: (1) faunal inclusions, (2) plant inclusions, (3) natural forms, (4) varieties of Baltic amber, (5) regional collection of succinite and other fossil resins, (6) imitations, (7) archaeological to contemporary artefacts.

(1) The collection of faunal inclusions grew the fastest, despite the fact that Andrzej W. SKALSKI, the first entomologist to take an interest in the collection's Lepidoptera inclusions, did not begin his research until the late 60s and early 70s. The first publication on this subject appeared in 1973 (Fig. 1). To this day researchers from Poland (over 30 individuals — KOTEJA 1999) and abroad (over 16 individuals) working on the Museum of the Earth's collection have, between them, undertaken studies of virtually every order of arthropod, publishing many of their findings.

From 1963 to 1999 Dr Róæa KULICKA (1944–1999) was curator of this collection, enlarging it and carrying out preliminary identification. The list of amber specimens containing inclusions compiled in 1990 (KULICKA 1990) concerned over 14000 items. In 1998 work began on computerizing the collection (using Microsoft Excel), based on the latest results of research carried out over the previous ten years. The collection compiled by Tadeusz GIECEWICZ is the largest of the Museum's individually compiled collections, numbering over 8000 thin sections prepared for analysis. A monographic report on this material, which was recovered from the north-east districts of Gdańsk: Stogi and Górki Zachodnie, and comes from Holocene sediments, will be published together with a catalogue, as a body of material suitable for statistical calculations.

The faunal inclusions collection also contains other individual collections, such as those of the well-known amber-workers Henryk KULIK (since1981), Henryk KALSKI, Cezary WÓJCIAK (since 1987), and that of the master of the radio-beacon in Krynica Morska Józef

Fig. 1. The first determined male holotype from the collections of the Museum of the Earth. Schiffermuelleria jantharica SKALSKI, 1977 (inv. No. 1831/14 MZ). Drawing by A.W. SKALSKI

JANCZYSZYN (53 pieces, 1972) — all of them having been donated to the Museum, or, as in the case of the Adam RYBICKI collection, consisting partly of donations.

The following specimens are among the rarest in the Musuem's faunal inclusions collection:

Crustacea, two specimens of Isopoda and one Amphipoda *Palaeogammarus* sp.; of the class Nemathelmintes, Rotatoria, fam. Brachionidae (KULICKA, KOSMOWSKA-CERANOWICZ 1999; JAŻDŻEWSKI, KULICKA 2000); one specimen of Embioptera, two specimens of Mecoptera, Diptera of the family Trichoceridae *Trichocera* (*Oligotrichocera*)? *antiqua* (DAHL) (the third known specimen of this family). The collection also includes six examples of Strepsiptera, which are extremely rare in Baltic amber. Evidence of mammals comes in the form of six specimens containing animal hair and about a dozen specimens with autopodial mammalian imprints on nodules of Baltic and Saxony amber (KULICKA, SIKORSKA-PIWOWSKA 1999). The holotypes of Thysanoptera recently written up by Gert SCHLIEPHAKE (2001) have brought the total number of holotypes from Museum of the Earth collection (Annex 1) to over 100.

(2) The collection of plant inclusions consists of nearly 1300 amber nodules containing either plant inclusions alone or specimens with a variety of inclusions — faunal as well as inorganic. Less impressive plant inclusions also occur in the collection of natural forms, amber varieties, the regional collection and the faunal inclusions collection.

The majority of specimens in this collection comprise small fragments of their plant of origin preserved in the resin of amberiferous trees 45 million years ago, either in their fresh state or in various stages of decay. The characteristic structure of organic tissues (including those of faunal remains), visible using either an optical microscope or a scanning electron microscope, was the subject of a joint study carried out by staff from the Museum of the Earth's Amber Department and from the Komarov Institute of Botany in Saint Petersburg (MIERZEJEWSKI 1976; PIELIŃSKA 1997).

Complete, small plants and bigger parts of large specimens have been systematically studied by experts from research centres in the USA, Germany, Russia and Poland. In some instances the remains of Myxomycetes, Lichens, Bryophyta, Pteridophyta, twigs and leaves of Gymnospermae, as well as flowers (Fig. 2), leaves and seeds of Angiospermae have been identified to species, genus or family, giving a total of nearly 100 plant inclusions (CREPET 1989; GROLLE 1985a, b; PIELIŃSKA 1990, 2001b; ZALEWSKA 1964, 1974). The remains of small liverworts have been studied in the greatest detail, three of which are holotypes of new species identified by Dr Riclef GROLLE of Jena (GROLLE 1985a, b). A number of reports have been published giving an overview and outline of the Museum of the Earth's plant inclusions collection (KOSMOWSKA-CERANOWICZ 1996; KULICKA, PIELIŃSKA 1998; PIELIŃSKA 1990, 1995, 2001c; SAMUL 1985), the most comprehensive of these, with photographs of 28 specimens (KOSMOWSKA-CERANOWICZ 1996).

Two groups of specimens, one containing particularly large amounts of sporomorphs, the second containing stellate oak hairs (a very common find in Baltic amber) have been singled out among the plant inclusions collection. Pollen analysis has been carried out by Janusz KĄCKI of the Museum's Amber Department and by Prof William L. CREPET of the USA (CREPET 1989).

A further addition to this collection are the pseudothallus specimens — morphological forms similar to plants but lacking any trace of cellular structure.

Some plant inclusions have been prepared for analysis in the form of microscope slides — over 150

Fig. 2. Flower, Theaceae family, in the Baltic Amber (inv. No. 16322 TG). Photo: J. Kupryjanowicz

slides in total. These specimens are also being systematically photographed.

The Amber Department has a contemporary comparative collection compiled by Z. Zalewska. This comprises: twigs and cones of 143 species of Gymnospermae; microscope slides of 100 species of tree; microscope slides of cuticles and leaves of 140 species of coniferous tree; microscope slides of pollen of 37 species of coniferous tree; pieces of bark, fragments of tree trunk and small nodules of coniferous tree resin.

(3) The collection of natural forms was acquired from the Sambian amber mine, mostly during the 70s and 80s, with care being taken to select the best preserved examples. Efforts were made to put together a collection which would illustrate as fully as possible the numerous ways in which resin accumulates (Kosmowska-Ceranowicz 2001b). Excluding pieces weighing less than 300 g, a total of 67 larger nodules were acquired which enabled a list of the most typical diagnostic features of amber accumulations to be drawn up. This collection evidences the fact that succinite comes from resin which, in almost all cases, accumulated either within or directly on its parent tree: dripping down into its crevices or onto its bark. Larger accumulations did not, however, form on the forest floor, as was the case with, for example, so-called amber from Borneo.

(4) The amber varieties collection has proven to require constant conservation. To maintain a particular variety of amber in the state that it was originally purchased for 20 years is practically impossible, to say nothing of accomplishing this feat over a period of 50 or more years. This is nothing new to museum staff who get around this problem by regularly re-polishing specimens before putting them on view in exhibitions. Amber-workers whose designs rely on contrasts in colour and translucency are also well aware of this problem. The various measures undertaken in the selection of amber for the reconstruction of the Amber Room serve as a good example of this. Nevertheless, at present, the Museum of the Earth's collection of amber varieties numbers around 3000 specimens, ranging from very small pieces to nodules weighing over 300 g (29 items), including seven nodules of between 900 and 1785 g which are suitable as research material for the study of weathering processes which affect amber. All the varieties within this collection have been classified (Leciejewicz 1996, 2001) and recorded in computer. This work makes use of A. Chętnik's posthumously published dictionary of amber varieties (1981), which was itself the result of many years' research into the various names used for amber in the Kurpie dialect.

(5) The regional collection of succinite and other fossil resins was the precursor of the Museum of the Earth's amber collection. It consisted of amber specimens, often accompanied by sediments (inv. Nos. 1-65), from the regions of Kurpie and Pomorania (Ko³obrzeg) which were either found and collected by A. Chętnik himself, or else acquired from "rural amber-workers" during the period from 1935 to 1952. This collection has been successively added to since 1985 and is currently the focus of infrared absorbtion spectroscopy analysis (Kosmowska-Ceranowicz 1990, 1999). Nearly 600 IR curves have been established to date for the specimens analysed. These now serve as a basic reference tool which can be useful in identifying fossil resins from around the world ("basic" — because the samples in question all require further analysis using different techniques). Many research centres turn to the Museum of the Earth for samples from this particular collection or submit resins for identification. Other items in this collection which are also suitable as research materials include a modest number of copal specimens, modern resins, colophony and so-called young amber (which may yet prove to date from the Tertiary period), which can be found on the southern Baltic coast.

(6) Imitations. These were acquired by Z. Zalewska during the 1950s and 60s and amount to *ca* 80 examples of ready-made goods (Fig. 3), blocks prepared for sale as raw material and irregular nodules. For many years this collection remained overlooked. Even so, very occasionally a new item was added to it, though no research was ever carried out on it. This was at least the case until recently, when imitation amber once again made a comeback and significant numbers of forgeries began to appear on the market. In 1997, 100 years after the first discovery of a lizard trapped in Baltic amber was recorded by Klebs (1910), another example of a lizard, *Succinilacerta succinea* Boulenger, 1917 (Borsuk-Białynicka, Łubka, Böhme 1999), was found by Gabriela Gierłowska on the Polish coast. No more than two weeks later the first forgery appeared (Kulicka 1999). Artificial resins are also being used nowadays to produce jewellery and other goods, as well as being offered for sale as raw material.

Fig. 3. Novolac necklaces, transparent, dark-red and burgundy in color, bead and pipe purchased from private individuals as 19th-century amber "antiques". From. the Museum of the Earth collections. Photo: L. Dwornik

The Museum of the Earth has embarked on a research programme into this problem, which was also the subject of a seminar held in Gdańsk as part of the International Amber Fair — AMBERIF '01 (Szadziewski 2001; Kosmowska-Ceranowicz 2001c; Matuszewska 2001). The jewellers' magazine *Polski Jubiler* 1(12), 2001 has also published three articles on the same theme.

The identification of new imitations which are constantly appearing on the market is very difficult and requires a great deal of research, which often reveals quite unexpected similarities between these artificial materials and natural resins (not only between polystyrene and siegburgite!). When subjected to infrared absorption spectroscopy analysis artificial resins yield curves which are characteristic, though not identical, for each variety of material. Large quantities of comparative materials printed in a multitude of different publications need to be studied in order to identify these IR curves.

(7) The artefacts collection. This has been divided into three sub-categories: archaeological artefacts, contemporary and historic pieces, and goods manufactured by the Staatliche Bernstein-Manufaktur Königsberg (SBM) (Kwiatkowska 2001).

The largest of these three, amounting to around 600 items, is the collection of archaeological artefacts, which comprises jewellery and ornaments, unfinished goods and crude amber. These include amber artefacts which are typical for the Neolithic, Roman or Early Medieval periods as well as items of a much earlier, prehistoric date. This collection is particularly valuable as an exhibition resource. It illustrates not only changes in fashion over a period of at least 5000 years but also changes in the techniques used to produce amber goods. Representative finds for the Neolithic period, for example, include pendants of various shapes, nodular beads with V-shaped holes, tubular beads and beads made to resemble double-headed axes. The Roman and early

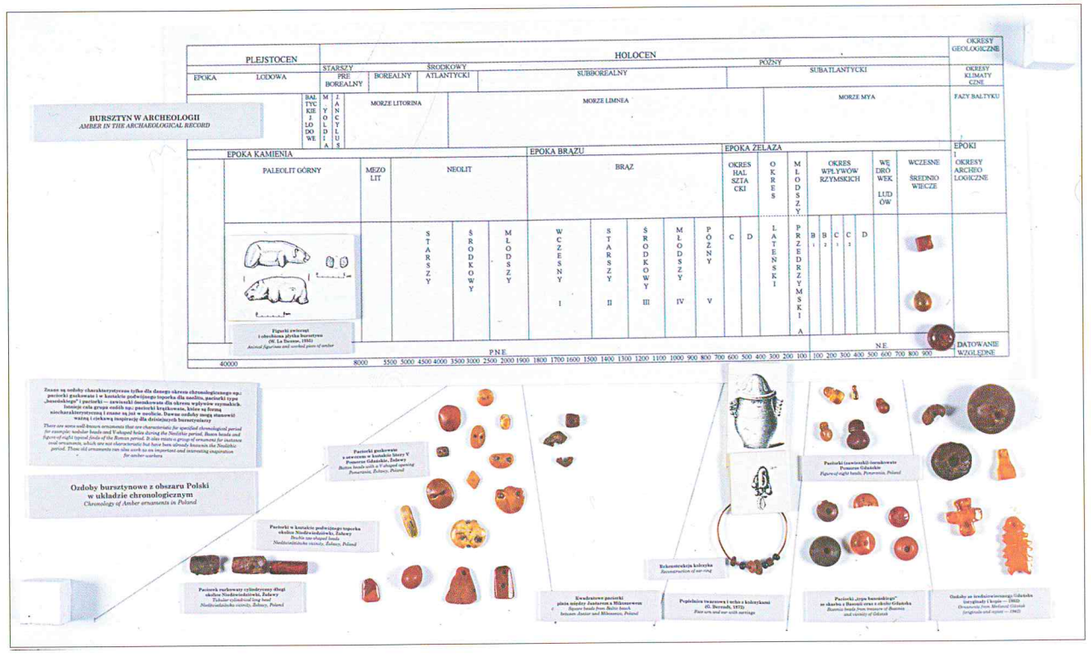

Fig. 4. Late Neolithic — Early Medieval ornaments (original and two copies) from Poland in chronological scheme (by K. Kwiatkowska) presented on the temporary exhibiton: "Amber — treasure of the ancient seas" in Bydgoszcz, 2001. Photo: £. Maklakiewicz

migration periods are characterised by figure-of-eight shaped beads (pendants) and "Bason" beads. Typical items for the early Middle Ages include crosses (both Latin and Maltese), various beads, pendants and spindle whorls (Fig. 4). The photograph in_does not show any archaeological finds of items of jewellery whose form has remained virtually unchanged from the end of the Neolithic up until the present day (Kwiatkowska 1996). This collection was established thanks to the efforts of the following collectors: Jan Fortini, Anatol Gupieniec (archaeologist) and, more recently, Cezary Wójciak.

The assemblage of contemporary and historic amber goods (Fig. 5) includes necklaces and similar items from the regions of Kurpie and Cashubia. Its origin dates back to A. Chętnik. The earliest acquisitions were products, both old and new (i.e. new at the time when they were acquired), made in the Kurpie region. The collection also boasts the work of many well-known master craftsmen of the 1950s, such as Tadeusz Kadela, Mieczysław Książek, Eugeniusz Rogoda, Władysław Łuckiewicz and Bruno Bach — "the Motława Master". The majority of pieces which joined the collection during the 1960s were purchased from antique shops. The late 60s saw the acquisition of the first works produced by Maria Lewicka-Wala, currently one of the most renowned names in amber jewellery design. In the 1970s pieces made by the following artists were also gained: Janusz Konaszewski, Giedymin Jabłoński, Maria Lewicka-Wala, Andrzej Mroziński, Marian Piźtkowski, Seweryna Gugała-Stolarska, Elæbieta & Marek Bejm. A much greater number of works by well-known artists and designers found their way into the collection during the final decade of the twentieth century. These include items by Barbara Guzik-Olszyńska, Danuta & Mariusz Gliwiński, Gabriela & Wiesław Gierłowski.

Up until the end of the 1980s the Museum maintained co-operative links with the Amber Goods Production Centre in Gdańsk Wrzeszcz (the company changed names on numerous occasions during this lengthy period of co-operation). Items from this factory can be found in the artefacts collection, as well as in the collection of amber varieties and inclusions.

Items produced by the SBM have been designated as a separate part of the aretfacts collection (Kwiatkowska

Fig. 5. Ash-pan, end of the XIX century. 20 x 12 x 4,5 cm, 300 g.; purchased in 1957. From. The Museum of the Earth collections (inv. No. 1087). Photo: T. Konart

2001). The materials in question consist of 44 pieces, including trinket boxes, a decorative seal, necklaces, various brooches etc. Both originals and goods imitating those produced by the Manufactory make up this collection. It came into being as a result of purchases dating primarily from 1956-1960, individual pieces being acquired occasionally in later years, the final addition coming in 1979. Initially, purchases were made in Gdynia, Sopot and Gdańsk. Subsequently, goods produced at the Manufactory were bought from antique shops throughout the entire country. This is a unique collection which illustrates the fact that goods are of greater value once their provenance has been established.

Alongside its exhibits, over a period of many years, the Museum has also amassed a significant amount of literature devoted to amber (The Amber Department Library). This encompasses a large number of publications covering a broad range of topics: palaeoentomology, palaeobotany, geology, archaeology and art, as well as newspaper articles and monographs, either in the original or photocopied. The requirements of the Amber Department have further been met through the acquisition of an extensive collection of specialist comparative literature in the field of botany, with particular emphasis on xylology and palaeoxylology.

Two bibliographies of amber-related articles have also been compiled (Pietrzak 1972; Kosmowska-Ceranowicz 1993, 1994), and the bibliography of *Bernstein in den Schriften der Königlichen Physikalisch-Ökonomischen Gesellschaft zu Königsberg (1860-1939)* (Kwiatkowska 1997). Work is currently ongoing on the compilation of another amber bibliography: *Schriften der Naturforschenden Gesellschaft in Danzig* and *Bernstein - Forschungen.*

References

Borsuk-Białynicka M., £ubka M., Böhme W. 1999: A lizard from Baltic amber (Eocene) and the ancestry of the crown group lacertids. *Acta Geologica Polonica* **44**(4), 349-382.

Chętnik A. 1981: Mały słownik odmian bursztynu bałtyckiego. *Prace Muzeum Ziemi* **34**, 31-38.

Crepet W.L. 1989: History and implications of the early North American fossil record of Fagaceae. In: *Evolution, Systematics and Fossil History of the Hammamelidae* **2**, 45-66.

Czeczott H. 1961: The flora of the Baltic Amber and its age. *Prace Muzeum Ziemi* **4**, 119-145.

Grolle R. 1985a: Fossil *Spruceanthus* in Europe and two other hepatics in Baltic amber. *Prace Muzeum Ziemi* **37**, 78-85.

Grolle R. 1985b: Monograph of *Frullania* in Baltic amber. *Prace Muzeum Ziemi* **37**, 87-100.

Jażdżewski K., Kulicka R. 2000: A note on amphipod crustaceans in a piece of Baltic amber. *Annales Zoologici* **50**(1), 99-100.

Klebs R. 1910: Ueber Bernsteineinschlüsse im allgemeinen und die Coleopteren meiner Bernsteinsammlung. *Schriften der physikalisch-ökonomischen Gesellschaft zu Königsberg* **51**, 217-242.

Kosmowska-Ceranowicz B. 1982: Problemy bursztynu na wystawach Muzeum Ziemi. *Przegląd Geologiczny* **30**(12), 651-653.

Kosmowska-Ceranowicz B. 1990: The scientific importance of museum collections of amber and other fossil resins. *Prace Muzeum Ziemi* **41**, 141-148.

Kosmowska-Ceranowicz B. (ed.): Baltic amber and other fossil resins in Polish literature and works by Polish authors in world literature. An annotated bibliography 1534-1993. Part I: Pietrzak T., Różycka T. — Amber in nature, culture and art, 1993. *Muzeum Ziemi. Opracowania dokumentacyjne* **12**, 1-164. Part II: Gula M., Kwiatkowska K. — Amber in Archaeology (1874-1993), 1994. *Muzeum Ziemi. Opracowania dokumentacyjne* **13**, 1-261.

Kosmowska-Ceranowicz B. 1996: Flora bursztynu. In: *Budowa Geologiczna Polski. Atlas Skamieniałości przewodnich i charakterystycznych. Część 3a. Kenozoik. Trzeciorzęd. Paleogen*, 433-435, 482-483.

Kosmowska-Ceranowicz B. 1999: Succinite and some other fossil resins in Poland and Europe (deposits, finds, features and differences in IRS). *Estudios del Museo de Ciencias Naturales de Alava* **14** (Núm. Espec. 2), 73-118.

Kosmowska-Ceranowicz B. 2001a: The old Gdańsk amber collection. *Prace Muzeum Ziemi* **46**, 81-106.

Kosmowska-Ceranowicz B. 2001B: Wie Bernstein entsteht. In: Krumbiegel G., Krumbiegel. B. (eds): *Faszination Bernstein. Kleinod aus der Wunderkammer der Natur*. 17-35. Goldschneck-Verlag. Korb.

Kosmowska-Ceranowicz B. 2001c: Amber Forgeries – copal and artificial resins. In: VIII Seminarium — Amberif '2001. *Muzeum Ziemi /Konferencje naukowe/ Streszczenia referatów* **13**, 29-36.

Kosmowska-Ceranowicz B., Popiołek J. 1981: On amber collections in Poland on the basis of unpublished Adam Chętnik's manuscripts from 1951-1958. *Prace Muzeum Ziemi* **34**, 3-29.

Koteja J. 1999: Palaeoentomology in Poland. In: Kosmowska-Ceranowicz B. & Paner H. (eds.): *Investigation into Amber. Proceedings of the International Interdisciplinary Symposium: Baltic Amber and Other Fossil Resins. 997 Urbs Gyddanyzc — 1997 Gdańsk. 2-6 September 1997, Gdańsk*. 61-67. Gdańsk.

Kulicka R. 1990: The list of animal inclusions in Baltic amber from collection of the Museum of the Earth in Warsaw (shortened version). In: Kosmowska-Ceranowicz B.: The scientific importance of museum collections of amber and other fossil resins. *Prace Muzeum Ziemi* **41**, 144-146.

Kulicka R. 1999: Fałszerstwa inkluzji w bursztynie. *Przegląd Geologiczny* **47**(1), 29-30, 100.

Kulicka R., Pielińska A. 1998: Plant and animal inclusions in the collection of the Museum of the Earth, PAS, in Warsaw. In: Amberif '98. 5. International Fair of Amber, Jewellery and Watches. *Muzeum Ziemi / Konferencje naukowe / Streszczenia referatów* **10**, 16-20.

Kulicka R., Kosmowska-Ceranowicz B. 1999: Rare organic inclusions in the Baltic amber. *Estudios del Museo de Ciencias Naturales de Alava* **14** (Núm. Espec. 2), 155-160.

Kulicka R., Sikorska-Piwowska Z. 1999: Mammalian ichnites in amber. In: Kosmowska-Ceranowicz B. & Paner H. (eds.): *Investigation into Amber. Proceedings of the International Interdisciplinary Symposium: Baltic Amber and Other Fossil Resins. 997 Urbs Gyddanyzc – 1997 Gdańsk. 2-6 September 1997, Gdańsk*. 83-87. Gdańsk.

Kwiatkowska K. 1996: Bursztynowe ozdoby pradziejowe i wczesnośredniowieczne w zbiorach Muzeum Ziemi PAN w Warszawie (z katalogiem). *Prace Muzeum Ziemi* **44**, 77-126.

Kwiatkowska K. 1997: Bernstein in der Schriften der Königlichen Physikalisch-Ökononischen Gesellschaft zu Königsberg. *Metalla. Veröffentlichungen aus dem Deutschen Bergbau-Museum* **66,** 29-38.

Kwiatkowska K. 2001: Wyroby Manufaktury Królewieckiej w zbiorach Muzeum Ziemi PAN w Warszawie. In: XV Meeting of Amber Research Workers "Amber conservation and collections" (Museum of the Earth, Warsaw, 13th October, 2000). Summaries of the reports. *Prace Muzeum Ziemi* **46**, 121-123.

Leciejewicz K. 1996: Varieties of Baltic amber. In: *Amber - Treasure of the Ancient Seas*. 13-16. Oficyna Wydawnicza Sadyba. Warszawa.

Leciejewicz K. 2001: *Bernstein — Varianten*. In: Krumbiegel G., Krumbiegel. B. (eds): *Faszination Bernstein. Kleinod aus der Wunderkammer der Natur*. 36-43. Goldschneck-Verlag. Korb.

Matuszewka A. 2001: Wykorzystanie zjawiska fluorescencji w identyfikacji i charakterystyce minerałów i kopalnej substancji organicznej — niektóre aspekty. In: VIII Seminarium - International Fair of Amber, Jewellery and Watches.Amberif '2001. *Muzeum Ziemi / Konferencje naukowe / Streszczenia referatów* **13**, 13-15.

Mierzejewski P. 1976: On application of scanning electron microscope to the study of organic inclusions from the Baltic amber. *Rocznik Polskiego Towarzystwa Geologicznego* **46**(3), 291-295.

Pielińska A. 1990: The list of plant inclusions in Baltic amber from collection of the Museum of the Earth in Warsaw (shortened version). In: Kosmowska-Ceranowicz B.: The scientific importance of museum collections of amber and other fossil resins. *Prace Muzeum Ziemi* **41**, 147-148.

Pielińska A. 1995: Flora w bursztynie bałtyckim ze zbiorów Muzeum Ziemi PAN. Stan opracowania, nowe nabytki. *Muzeum Ziemi / Konferencje naukowe / Streszczenia* **3**, 9-11.

Pielińska A. 1997: Inclusions of wood in the amber collections of the Museum of the Earth in Warsaw. *Metalla. Veröffentlichungen aus dem Deutschen Bergbau-Museum* **66**, 25-28.

Pielińska A. 2001a: Fragment bursztynowej kolekcji H.R. Goepperta w zbiorach Muzeum Geologicznego Uniwersytetu Wrocławskiego. *Prace Muzeum Ziemi* **46**, 107-116.

Pielińska A. 2001b: Inkluzje roślinne w kolekcji Tadeusza Giecewicza. In: XV Meeting of Amber Research Workers "Amber conservation and collections" (Museum of the Earth, Warsaw, 13th October, 2000). Summaries of the reports. *Prace Muzeum Ziemi* **46**, 120.

Pielińska A. 2001c: Pflanzen im Bernstein. In: Krumbiegel G., Krumbiegel. B. (eds): *Faszination Bernstein. Kleinod aus der Wunderkammer der Natur*. 44-50. Goldschneck-Verlag. Korb.

Pietrzak T, 1972: Baltic amber in Polish literature (1534-1967). 1-68. Wydawnictwa Geologiczne. Warszawa.

Samul A. 1985: Stan badań nad inkluzjami roślinnymi w bursztynie bałtyckim. *Wiadomości Entomologiczne* **6**(3-4), 159-166.

Schliephake G. 2001: Thysanoptera (Insecta) of the Tertiary amber of the Museum of the Earth, Warsaw, with keys to the species of the Baltic and Bitterfeld amber. *Prace Muzeum Ziemi* **46**, 17-39.

Skalski A.W. 1973: Notes on the Lepidoptera from fossil resins. *Polskie Pismo Entomologiczne* **43**, 647-654.

Szadziewski R. 2001: Forgeries of Baltic amber inclusions. In: VIII Seminarium – International Fair of Amber, Jewellery and Watches, Amberif 2001. *Muzeum Ziemi / Konferencje naukowe / Streszczenia referatów* **13**, 37-42.

Zalewska Z. 1964: *Amber in Poland. A short guide to the exhibition*. 1-20. Warszawa.

Zalewska Z. 1974a: Geneza i stratygrafia złóż bursztynu bałtyckiego. *Biuletyn Instytutu Geologicznego* **281**, 139-173.

Zalewska Z. 1974b: *Amber in Poland. A guide to the exhibition*. 1-108. Wydawnictwa Geologiczne. Warszawa.

ANNEX 1

List of the holotypes in the collections of the organic inclusions of the Museum of the Earth, Warsaw

ANIMAL INCLUSIONS

Order Aranea

fam. Nesticidae *Eopopino inspinatus affinis* Wunderlich, 1986 (12581 MZ)

fam. Salticidae *Eolinus balticus* Żabka, 1988 (2923 MZ)

Eolinus tystschenkoi Prószyński et Żabka, 1980 (14928 TG)

Order Acarina

fam. Caeculidae *Procaeculus eridanosae* Coineau et Magowski, 1994 (11533 b TG)

fam. Camerobiidae *Neophyllobius succineus* Boland et Magowski, 1990 (16749 TG)

fam. Parasitidae *Aclerogamascus stenocornis* Witaliński, 2000 (5895 TG)

Order Thysanoptera

fam. Aeolothripidae *Rhipidothripoides involvus* Schliephake, 2001 (14159 TG)

Archankothrips zawirskae Schliephake, 2001 (18332 TG)

fam. Adiheterothripidae *Stenurothrips polonius* Schliephake, 2001 (18780 TG)

Holarthrothrips crassicornis Schliephake, 2001 (19415 TG)

fam. Thripidae *Anaphothrips pusillus* Schliephake, 2001 (5593 TG)

Dendrothrips giecewiczi Schliephake, 2001 (15035 TG)

Taeniothrips litoralis Schliephake, 2001 (13879 TG)

Taeniothrips majoribalticus Schliephake, 2001 (16276 TG)

Schedodendrothrips ursulae Schliephake, 2001 (16536 TG)

Protoxythrips stenuroideus Schliephake, 2001 (20197 TG)

fam. Phlaeothripidae *Protolispothrips multisetiger* Schliephake, 2001 (5594 TG)

Order Heteroptera

fam. Miridae *Ambercylapus nigrus* Carvalho et Popov, 1984 (2344/40 MZ)

Balticofulvius kulickae Herczek et Popov, 1997 (17356 TG)

Epigonomiris skalskii Herczek et Popov, 1998 (22932 MZ)

Ambocylapus kulickae Herczek et Popov, 2000 (23136 MZ publ.as 2293)

Electromyiomma polonicum Popov et Herczek, 1992 (13098 TG)

Myiomma voigti Popov et Herczek, 1992 (13670 MZ)

Metoisops kerzneri Popov et Herczek, 1992 (14646 TG)

Hallodapomimus elektrinus Herczek, 2000 (22918)

fam. Aradidae *Aradus frater* Popov, 1978 (5624 TG)

fam. Anthocoridae *Persephonocoris kulickae* Popov et Herczek, 2001 (22931 MZ)

Order Homoptera

Suborder Coccinea

fam. Eriococcidae *Balticococcus spinosus* Koteja, 1988 (a) (15493 TG) larva

Gedanicoccus gracilis Koteja, 1988 (a) (15494 TG) larva

fam. Kermesidae *Sucinikermes kulickae* Koteja, 1988 (b) (14669 TG) larva

Suborder Psylliformes

fam. Aphalaridae (= fam. Psyllidae)

Eogyropsylla eocenica Klimaszewski, 1993 (14667 TG)

Eogyropsylla jantaria Klimaszewski, 1993 (21096 MZ)

Suborder Aphidinea

fam. Elektraphididae *Skalskiana malakiae* Wegierek, 1996 (11496 TG)

fam. Mindaridae *Mindarus incrustatus* Wegierek, 1996 (14448 TG)

fam. Pemphigidae *Ambopemphigus romani* Wegierek, 1996 (5948a, b TG)

Germaraphis paradryoides Wźgierek, 1990 (8558 MZ)

fam. Drepanosiphidae *Lyncuricallis polonicus* Wegierek, 1996 (10241 MZ)

Glaesaricallis kulickae Wegierek, 1996 (16809 TG)

fam. Aphididae *Halajaphis siphonosetae* Wegierek, 1996 (6543 MZ)

fam. Derbidae *Positrona shcherbakovi* Emelianov, 1994 (4390 MZ)

Suborder Fulgoroidea

fam. Cixiidae *Kulickamia jantaris* Gźbicki et Szwedo 2000 (6455 MZ)

Order Coleoptera

fam. Curculionidae *Sucinostyphlus mroczkowskii* Kuśka, 1996 (6427 MZ)

Phloeophagus sucinopunctatus Kuśka, 1992 (7554 MZ, publ. as 554)

Sucinophyllobius viridis Wanat et Borowiec, 1986 (5637 TG)

fam. Anobiidae *Anobium (Microbregma) sucinoemarginatum* Kuśka, 1992 (21644 TG)

fam. Lathridiidae *Lathridius jantaricus* Borowiec, 1985 (5646 TG)

Lathridius kulickai Borowiec, 1985 (17798 TG)

fam. Cantharidae *Cantharis sucinonigra* Kuśka, 1992 (18094 MZ)

Absidiella sucinokotejai Kuśka, 1996 (10424 MZ)

Sucinorhagonycha kulickae Kuśka, 1996 (22345 MZ)

Order Strepsiptera

fam. Myrmecolacidae *Palaeomyrmecolax succineus* Kulicka, 2001 (16321 TG)

Palaeomyrmecolax giecewiczi Kulicka, 2001 (15119 TG)

Palaeomyrmecolax gracilis Kulicka, 2001 (19593 TG)

fam. Stylopidae *Jantarostylops kinzelbachi* Kulicka, 2001 (18139 TG)

fam. Mengeidae *Mengea mengei* Kulicka, 1979 (13561 MZ)

fam. Mengeidae *Mengea tertiaria* (Menge) Kulicka, 1977 (13561 TG) NEOTYPE

Order Hymenoptera

fam. Dryinidae *Laberites polonicus* N.Ponomarenko, 1989 (8736 MZ)

fam. Ichneumonidoidea, subfam. Paxylommatidae

Paxylommites reticulatus Kasparyan, 1988 (17387 TG)

Tobiasites striatus Kasparyan, 1988 (19140 TG)

subfam. Townesitinae *Marjorietta major* Kasparyan, 1994 (17828 TG)

subfam. Amiseginae *Protadelphme aenea* Krombein, 1986 (6473 MZ)

Palaeochrum diversum Krombein, 1986 (19774 TG)

Order Lepidoptera

fam. Tineidae *Simulotinea intermedia* Skalski, 1977 (1535/8 MZ)

fam. Oecophoridae *Schiffermuelleria jantharica* Skalski, 1977 (1831/14 MZ)

Microsymmocites kuznetzovi Skalski, 1977 (2015/1 MZ)

Order Diptera

fam. Ceratopogonidae *Ceratopogon grogani* Szadziewski, 1988 (11411 TG)

Ceratopogon remmicolus Szadziewski, 1988 (15788 TG)

Ceratopogon tertiaricus Szadziewski, 1988 (16125 TG)

Ceratopogon margaritae Szadziewski, 1988 (19087 TG)

Ceratopogon gedanicus Szadziewski, 1989 (4483 MZ)

Ceratopogon ceranowiczi Szadziewski, 1988 (18553d MZ)

Ceratopogon ritzkowskii Szadziewski, 1988 (18553 a MZ)

Ceratopogon hennigi Szadziewski, 1988 (4504 MZ)

Serromyia polonica Szadziewski, 1988 (14977 TG)

Serromyia succinea Szadziewski, 1988 (11907 MZ)

Serromyia ryszardi Borkent, 1990 (16110 TG)

Serromyia sinuosa Borkent, 1990 (14972 TG)

Serromyia anomalicornis Szadziewski, 1988 (5045 TG) NEOTYPE

Brachypogon (B) gedanicus Szadziewski, 1988 (20007 TG)

Atrichopogon eocenicus Szadziewski, 1988 (4834 TG)

Monohelea baltica Szadziewski, 1988 (18161 TG)

Meunierohelea gedanicola Szadziewski, 1988 (5018 TG)

Mantohelea gedanica Szadziewski, 1988 (10026 MZ)

Gedanohelea succinea Szadziewski, 1988 (20010 TG)

Eohelea petrunkevitchi Szadziewski, 1984 (13990 TG)

Eohelea grogani Szadziewski, 1988 (14831 TG)

Bezzia eocenica Szadziewski, 1988 (16584 TG)

Culicoides (subg.?) *ceranowiczi* Szadziewski, 1988 (4827 TG)

Culicoides succivarius Szadziewski, 1988 (11926 MZ)

Culicoides (subg.?) *gedanensis* Szadziewski, 1988 (18558 MZ)

Culicoides (subg.?) *eoselficus* Szadziewski, 1988 (5205 TG)

Culicoides (Oecacta) balticus Szadziewski, 1988 (19193 TG)

Alluaudomyia succinea Szadziewski, 1988 (2353/32 MZ)

Palpomyia jantari Szadziewski, 1988 (1325 MZ)

Wirthohelea trifida Szadziewski, 1988 (4457 MZ)

Gedanohelea loewi Szadziewski, 1988 (10287 MZ)

Gedanohelea succinea Szadziewski, 1988 (20010 TG)

Forcipomyia (F.) gedanicola Szadziewski, 1988 (10116 MZ)

Forcipomyia (subg?) *krzeminskii* Szadziewski, 1988 (8156 MZ)

Forcipomyia (F.) eocostata Szadziewski, 1988 (8035 MZ)

Forcipomyia (subg?) *eobreviflagellata* Szadziewski, 1988 (19242 TG)

Dasyhelea stanislavi Szadziewski, 1988 (9617 MZ)

Dasyhelea eodicryptoscenica Szadziewski, 1988 (9356 MZ)

Dasyhelea gedanica Szadziewski, 1988 (16133 TG)

Atriculicoides cenomanensis Szadziewski et Schlüter, 1992* (23935 MZ)

Atriculicoides incompletes Szadziewski et Schlüter, 1992* (23936 MZ)

Austroconops borkenti Szadziewski et Schlüter, 1992*(23937 MZ)

fam. Limoniidae, subfam. Limoniinae

Thaumastoptera ryszardi Krzemiński, 1985 (6545 MZ)

Helius abditus Krzemiński, 1985 (7895 MZ)

PLANT INCLUSIONS

Division Bryophyta

Class Hepaticae

fam. Frullaniaceae *Frullania casparyi* Grolle, 1985b (17449 TG)

Frullania baltica Grolle, 1985b (15084 TG)

fam. Lejeuneaceae *Spruceanthus polonicus* Grolle, 1985a (469/2 MZ)

Compiled by B. Kosmowska-Ceranowicz & A. Pielińska

** In Cretaceous fossil resin.*

References *(to the Holopypes)*

Boland H.R. & W.L. Magowski 1990: *Neophyllobius succineus* n.sp. from Baltic amber (Acari: Raphignathoidea, Camerobiidae). *Ent. Ber. Amst.* **50**(2), 17-21.

Borkent A. & B. Bisset 1990: A revision of the Holarctic species of *Serromyia* Meigen (Diptera: Ceratopogonida). *Systematic Entomology* **15**, 153-217.

Borowiec L. 1985: Two new species of *Lathridius* sensu lato (Coleoptera, Lathridiidae) from Baltic amber. *Polskie Pismo Entomologiczne* **55**, 251-254.

Carvalho J.C.M. & Y.A. Popov 1984: A new genus and species of mirid bug from the Baltic amber (Hemiptera, Miridae). *Ann.Acad.Brasi.Cienc.* **56**(2), 203-205.

Coineau Y. & W.L. Magowski 1994: Caeculidae in amber. *Acarologia* **30**(3), 243-246.

Emelianov A.F. 1994: The first find of fossil Derbidae and a redescription of Paleogene Acholid *Hooleya* Cockerell (Insecta: Homoptera, Fulgoroidea). *Paleontologicheskij Zhurnal* **3**, 76-82.

Grolle R. 1985a: Fossil *Spruceanthus* in Europe and two other hepatics in Baltic amber. *Prace Muzeum Ziemi* **37**, 78-85.

Grolle R. 1985b: Monograph of *Frullania* in Baltic amber. *Prace Muzeum Ziemi* **37**, 87-100

Gębicki C. & Szwedo J. 2000: *Kulickamia jantaris* gen. et sp. n. from Baltic amber (Hemiptera: Fulgoroidea: Cixiidae). *Poskie Pismo Entomologiczne* **69**(2), 167-173.

Herczek A. 2000: First Phylinae (Heteroptera: Miridae) from Baltic Amber. *Polskie Pismo Entomologiczne* **69**(2), 143-153.

Herczek A. & Y.A. Popov 1997: On the mirid genera *Archeofulvius* CARVALHO and *Balticofulvius* n.gen from Baltic amber (Heteroptera: Miridae, Cylapinae). *Mitteilungen aus dem Geologisch-Paläontoligischen Institut der Universität Hamburg* **80**, 179-187.

Herczek A. & Y.A. Popov 1998: *Epigonomiris skalskii*, a new mirinae plant bug from Baltic amber (Heteroptera: Miridae: Cylapinae). *Polskie Pismo Entomologiczne* **67**, 175-178.

Herczek A. & Y.A. Popov 2000*: Ambocylapus kulickae* gen. et sp.n., a new plant bug from Baltic amber (Heteroptera: Miridae: Cylapinae). *Polskie Pismo Entomologiczne* **69**(2), 155-160.

Kasparyan D.R. 1988: Nowyje taksony ichnewmonoidnych naezdnikow sem. Paxylommatidae (Hymenoptera, Ichneumonoidea) iz baltijskogo jantarja. Sistematika nasekomych i Kleszczej. Nauka, *Tr.BEO* **70**, 125-131.

Kasparyan D.R. 1994: A review of ichneumon flies of the Townesitinae subfam. nov. (Hymenoptera, Ichneumonidae) from the Baltic ambers. (In Russian). *Paleontologicheskij Zhurnal* **4**, 86-96.

Klimaszewski S.M. 1993: New species of Eocene psyllids representing the tribe *Paleopsylloidini* Becker-Midgisova (Homoptera, Aphalaridae). *Acta Biologica Silesiana* **22**(39), *Prace Naukowe Uniwersytetu Śląkiego* **1336**, 9-18.

Koteja J. 1988a: Erococcid crawlers (Homoptera, Coccinea) from Baltic amber. *Polskie Pismo Entomologiczne* **58**, 503-524.

Koteja J. 1988b: *Sucinikermes kulickae* gen. et sp. n. (Homoptera, Coccinea) from Baltic amber. *Polskie Pismo Entomologiczne* **58**, 525-535.

Krombein K.V. 1986: Three cuckoo wasps from Siberian and Baltic amber (Hymenoptera: Chrysididae: Amiseginae and Elampinae). Proc.Entomol.Soc.Wash. **88**(4), 740-747.

Krzemiński W. 1985: Limoniidae (Diptera Nematocera) from Baltic amber (in the collection of the Museum of the Earth in Warsaw). Part I. Subfamily Limoniinae. *Prace Muzeum Ziemi* **37**, 113-117.

Kulicka R 1977: *Mengea tertiaria* w bursztynie bałtyckim (w zbiorach Muzeum Ziemi PAN) *Przegląd Geologiczny* **25**(10), 32-33.

Kulicka R. 1979: *Mengea mengei* sp. n. from Baltic amber. *Prace Muzeum Ziemi* **32**, 109-112.

Kulicka R 2001: New genera and species of Strepsiptera from the Baltic amber. *Prace Muzeum Ziemi* **46**, 3-16.

Kuśka A. 1992: Three new species of beetles (Coleoptera: Cantharidae, Anobiidae, Curculionidae) from the Baltic amber. *Annales of the Upper Silesian Museum — Entomology* **3**, 107-113.

Kuśka A. 1996: New beetle species (Coleoptera, Cantharidae, Curiculionidae) from the Baltic amber. *Prace Muzeum Ziemi* **44**, 13-18.

Ponomarenko N.G. 1988: The first discovery of a male dryinid (Insecta) from Baltic amber. *Paleontological Journal* **22**(4), 105-108.

Popov Y.A. 1978: New species of Aradidae (Hemiptera) from Baltic amber. *Prace Muzeum Ziemi* **29**, 137-140.

Popov J. & Herczek A. 1992: The first Isometopinae from Baltic amber (Heteroptera, Miridae). *Mitteilungen aus dem Geologisch-Paläontologischen Institut der Universtät Hamburg* **79**, 241-258.

Popov J. & Herczek A. 2001: A new flower bug (Hemiptera: Heteroptera, Anthocoridae) from the Baltic amber. *Prace Muzeum Ziemi* **46**, 55-58.

Prószyński J. & M. Żabka: 1980 Remarks on Oligocene amber spiders of the family Salticidae. *Acta Paleontologica Polonica* **25**(2), 213-223..

Schliephake G. 2001: Thysanoptera (Insecta) of the Tertiary amber of the Museum of the Earth, Warsaw, with keys to the species of the Baltic and Bitterfed amber. *Prace Muzeum Ziemi* **46**, 17-39.

Skalski A.W. 1977: Studies on the Lepidoptera from fossil resins. Part. I. *Prace Muzeum Ziemi* **26**, 3-24.

Szadziewski R. 1984: Niezwykłe narządy strydulacyjne u eoceńskich muchówek z rodziny Ceratopogonidae (Diptera). *Wiadomości Entomologiczne* **5**(1/2), 37-40.

Szadziewski R. 1985: Biting midges of the genus *Eohelea* Petrunkevitch (Insecta, Diptera, Ceratopogonidae) from Baltic amber. *Prace Muzeum Ziemi* **37**, 123-130.

Szadziewski R. 1988: Biting midges (Diptera, Ceratopogonidae) from Baltic amber. *Polskie Pismo Entomologiczne*, **58**, 3-283.

Szadziewski R. & Schluter T. 1992: Biting midges (Diptera: Ceratopogonidae) from Upper Cretaceous (Cenomanian) amber of France. Ann. Soc. Ent. Fr. **28** (1), 73-81.

Wanat M. & Borowiec L. 1986: New genus of weevil (Coleoptera, Curculionidae) from Baltic amber. *Polskie Pismo Entomologiczne* **56**, 243-247.

Węgierek P. 1990: Aphid species from the collection of Baltic amber in the Museum of the Earth PAS in Warsaw. *Prace Muzeum Ziemi* **41**, 83-88.

Węgierek P. 1996: Aphid species (Homoptera: Aphidinea) from the collection of the Baltic amber in the Museum of the Earth, Polish Academy of Sciences, Warsaw (Part two). *Prace Muzeum Ziemi* **44**, 25-39.

Witaliński W. 2000: *Aclerogamasus stenocornis* sp.n., a fossil mite from the Baltic amber (Acari: Gamasida: Parasitidae). *Genus* **11**(4), 619-626.

Wunderlich J. 1986: Spinnenfauna gestern und heute. 1-283. Wiesbaden.

Żabka M. 1988: Fossil Eocene Salticidae (Araneae) from the collection of the Museum of the Earth in Warsaw. *Ann. Zool.* **41**(13), 415-420.