University of Gdańsk

Subject card

Subject name and code	Life in amber, PG_00154190						
Field of study	Life in amber (Wykład)						
Date of commencement of studies	October 2023		Academic year of realisation of subject	2024/2025			
Education level	Master's studies		Subject group				
Mode of study	full-time studies		Mode of delivery	at the university			
Year of study	2		Language of instruction	English			
Semester of study	3		ECTS credits	2.0			
Learning profile	academic		Assessment form	credit			
Conducting unit	Laboratory of Evolutionary Entomology and Museum of Amber Inclusions -> Katedra Zoologii Bezkręgowców i Parazytologii -> Faculty of Biology -> Rector						
Name and surname of lecturer (lecturers)	Subject supervisor	dr hab. Jacek Szwedo					
	Teachers						
Lesson types	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	0.0	0.0	15
	E-learning hours included: 0.0						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours	Self-study	SUM	
	Number of study hours	15		3.0	32.0	50	
Subject objectives	- Knowledge of the major fossil resins and their stratigraphic and geographical distribution.- Knowledge of the more important taxa occurring among inclusions in fossil resins.To be able to infer the palaeoecology and evolution of taxa, their palaeodiversity systematically and morphologically, and reconstruct palaeoenvironments on the basis of knowledge of inclusions in fossil resins.- To develop interests in evolutionary and phylogenetic science, palaeontology, and amber-craft-and-knowledge more broadly.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[BIOLMU2_K05] the graduate is prepared to use recognised sources of scientific and popular information in the biological sciences to further his or her knowledge	Understands the need to use recognised sources of scientific and popular scientific information in the biological and earth sciences to deepen their knowledge	[SK1] wypowiedź ustna/rozmowa/ dyskusja [SK2] prezentacja/projekt/referat/ raport [SK3] opracowanie tekstowe/ praca pisemna [SK4] test/egzamin - ustny lub pisemny
[BIOLMU2_U07] the graduate is able to critically confront biological information from a variety of sources and, on this basis, draw valid conclusions	Confronts critically biological information from different sources and, on this basis draws reasoned conclusions	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU2] prezentacja/projekt/referat/ raport [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
[BIOLMU2_U03] the graduate can critically analyse and select biological information, especially from electronic sources	Demonstrates the ability to critically analyse and select biological and geological information, especially from internet and electronic sources	[SU1] wypowiedź ustna/rozmowa/ dyskusja [SU2] prezentacja/projekt/referat/ raport [SU3] opracowanie tekstowe/ praca pisemna [SU4] test/egzamin - ustny lub pisemny
[BIOLMU2_W04] the graduate has an in-depth knowledge of the chosen speciality of biological sciences	- Is familiar with palaeontological research methods and is able to interpret their results - Is familiar with the methods of evolutionary and palaeoenvironmental reconstructions and is able to interpret their results	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW2] prezentacja/projekt/referat/ raport [SW3] opracowanie tekstowe/ praca pisemna
[BIOLMU2_W01] the graduate has an in-depth knowledge and understanding of natural phenomena and processes at different levels of complexity	- Recognises and characterises the main ways in which the remains of of organisms in fossil material - Recognises the behavioural patterns of fossil material and is able to relate these to biotic and environmental changes at the site of deposition - Correctly identifies and interprets observed changes occurring during biostratinomic processes - Knows and understands the significance of diagenetic changes and can correctly interpret them correctly	[SW4] test/egzamin - ustny lub pisemny [SW1] wypowiedź ustna/rozmowa/ dyskusja [SW2] prezentacja/projekt/referat/ raport [SW3] opracowanie tekstowe/ praca pisemna

Subject contents

- Types of fossil resins.- Occurrence of fossil resins in the world.- Taphonomy of fossil resins.- Taphonomy of inclusions.- Organic inclusions.- Review of phyto- and zooinclusions preserved in Baltic amber.- Importance of inclusions in the study of evolution, phylogeny and historical zoogeography of insects.- Preparation of inclusions for scientific research.- Recognition of imitation and falsification techniques in amber and inclusions in fossil resins.

Prerequisites and co-requisites

- Knowledge of basics of systematic botany.- Knowledge of basics of ecology.- Knowledge of systematics of invertebrates.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
written exam	61.0%	100.0%

Recommended reading	Basic literature	Erichson U., Weitschat W. 2008. Baltic amber. German Amber Museum Ribnitz-Damgarten, Ribnitz-Damgarten. Grimaldi D. 1996. Amber: window to the past. American Museum of Natural History. Grimaldi D., Engel M.S. 2005. Evolution of the insects. Cambridge Univ. Press. Gröhn C. 2015. Einschlüsse im Baltischen Bernstein. Wachholtz Verlag, Kiel. Gröhn C. 2019. Alles über Bernstein. Wachholtz Verlag, Kiel. Gröhn C. & Kobbert M.J. 2017. Pflanzen seit der Saurierzeit eingeschlossen in Bernstein. Wachholtz Verlag, Kiel. Kosmowska-Ceranowicz B. 2017. Bursztyn w Polsce i na świecie. Amber in Poland and in the World. Wydawnictwa Uniwersytetu Warszawskiego, Warszawa. Pańczak J., Kosakowski P., Drzewicz P. & Zakrzewski A. 2024. Fossil resinsA chemotaxonomical overview. Earth-Science Reviews, 255, 104734. https://doi.org/10.1016/j.earscirev.2024.104734 Penney D. 2010. Biodiversity of fossils in amber from the major World deposits. Siri Scientific Press, Manchester. Penney D. 2016. Amber palaeobiology. Research trends and perspectives for the 21st century. Siri Scientific Press, Manchester. Rappsilber I. 2022. Bitterfelder Bernstein: Geschichte - Vielfalt - Entstehung / Bitterfeld Amber: History - Diversity - Origin. Ampyx-Verlag, Halle. Sadowski E.-M., Schmidt A.R., Seyfullah L.J., Kunzmann L. 2017. Conifers of the "Baltic amber forest" and their palaeoecological significance. Stapfia 106: 1-73. Seyfullah L.J., Beimforde C., Dal Corso J., Perrichot V., Rikkinen J., & Schmidt A.R. 2018. Production and preservation of resins past and present. Biological reviews of the Cambridge Philosophical Society, 93(3), 16841714. https://doi.org/10.1111/brv.12414 Szadziewski R., Pytlos R. & Szwedo J. (eds.), Bursztyn bałtycki skarb Zatoki Gdańskiej / Baltic amber treasure of the Bay of Gdańsk. Związek Miast i Gmin Morskich, Gdańsk. Szadziewski R., Szwedo J. & Sontag E. 2016. Znaczenie inkluzji zwierzęcych w paleorekonstrukcjach klimatu, ekologii lasów bursztynowych oraz identyfikacji bursztynów [Significance of animal inclusions in paleoreconstructions of climate, ecology of amber forests and identification of ambers]: 4251. In: Gazda L. (ed.) Lubelski bursztyn. Stellarium, Kraków. Szwedo J. & Kania I. 2015. Rekonstrukcje klimatyczne na podstawie inkluzji / Climatic reconstructions based on inclusions. Amber news review 2014/2015, World Amber Council, Gdańsk, Poland, 2015, pp. 621. Mayors Office for City Promotion, City Hall of Gdańsk, Gdańsk. Weitschat W. & Wichard W. 2002. Atlas of plants and animals in Baltic amber. Verlag Dr. Friedrich Pfeil, Munich.

		Wichard W., Gröhn C. & Seredszus F. 2009. Wasserinsekten im Baltischen Bernstein / Aquatic Insects in Baltic Amber. Verlag Kessel, Remagen. Zherikhin V. V., Ponomarenko A. G. & Rasnitsyn A. P. 2008. Vvedenie v paleoentomologiyu. Tovarishchestvo Nauchnykh Izdanii KMK, Moskva.

	Supplementary literature	Bonino E. 2022. AmberArt a journey between Science and Beauty. Self publishing. Drohojowska J., Zmarzły M., Szwedo J. 2024. The discovery of a fossil whitefly from Lower Lusatia (Germany) presents a challenge to current ideas about Baltic amber. Scientific Reports, 14, 23102. https://doi.org/10.1038/s41598-024-74197-8 Jiang H., Tomaschek, F., Muscente A.D., Niu C.T., Thet Tin Nyuntg, Fang Y., Schmidt U., Chen J., Lönartz M., Mähler B., Wappler T., Jarzembowski E.A., Szwedo J., Zhang H.C., Rust J. & Wang B. 2022. Widespread mineralization of soft-bodied insects in Cretaceous amber. Geobiology 20 (3), 363376. https://doi.org/10.1111/gbi.12488 Kosmowska-Ceranowicz B. & Gierłowski W. 2005. Bursztyn. Poglądy, opinie. Bursztynowa Hossa, Gdańsk-Warszawa. Kosmowska-Ceranowicz B. & Gierłowski W. 2010. Bursztyn. Poglądy, opinie. Tom 2. Materiały z seminariów Amberif 2005-2009. Międzynarodowe Stowarzyszenie Bursztynników, Muzeum Ziemi PAN w Warszawie, Międzynarodowe Targi Gdańskie SA, Gdańsk-Warszawa. Kosmowska-Ceranowicz B., Gierłowski W. & Wagner-Wysiecka E. 2016. Bursztyn. Poglądy, opinie. Tom 3. Materiały z seminariów Amberif 2010-2015. Międzynarodowe Stowarzyszenie Bursztynników, Muzeum Ziemi PAN w Warszawie, Międzynarodowe Targi Gdańskie SA, Wydział Chemiczny Politechnika Gdańska, Gdańsk-Warszawa. Krzemińska E., Krzemiński W. 1992. W bursztynowej pułapce. Wyd. Inst. Syst. i Ewol. Zw. PAN, Kraków. Matuszewska A. 2010. Bursztyn (sukcynit), inne żywice kopalne, subfosylne i współczesne. Oficyna Wydawnicza WW, Uniwersytet Śląski, Katowice. Naglik B., Mroczkowska-Szerszeń M., Dumańska-Słowik M., Natkaniec-Nowak L., Drzewicz P., Stach P. & Żukowska G. 2020. Fossil resinsconstraints from portable and laboratory near-infrared Raman spectrometers. Minerals, 10(2), 104. https://doi.org/10.3390/min10020104 Natkaniec-Nowak L., Drzewicz P., Stach P., Mroczkowska-Szerszeń M. & Żukowska G. 2023. The overview of analytical methods for studying of fossil natural resins. Critical Reviews in Analytical Chemistry, 54(8), 27542776. https://doi.org/10.1080/10408347.2023.2200855 Rappsilber I. 2016. Fauna und Flora des Bitterfelder Bernsteinwaldes. Ampyx-Verlag Dr. Andres Stark, Halle Seyfullah L.J., Szwedo J., Schmidt A.R., Prestianni C. 2024. Fossiliferous amber from the early Eocene of Belgium. Scientific Reports 14, 13705. https://doi.org/10.1038/s41598-024-64286-z Vorontsov D.D., Kolesnikov V.B., Voronezhskaya E.E., Perkovsky E.E., Berto M.M., Mowery J., Ochoa R. & Klimov P.B. 2023. Beyond the limits of light: an application of super-resolution confocal microscopy (SCLSM) to investigate Eocene amber microfossils. Life, 13(4), 865. https://doi.org/10.3390/life13040865 Zhang Z. & Shen A. 2023. Fluorescence and phosphorescence spectroscopies and their applications in gem characterization. Minerals, 13(5), 626. https://doi.org/10.3390/min13050626
	eResources addresses	

Example issues/ example questions/ tasks being completed	Taphonomic concepts of the preservation of fossil resinsTaphonomy of inorganic inclusionsBiostratinomy and taphonomy of organic inclusionsChronostratigraphy of fossil resinsMethodology for the study and documentation of inclusions in fossil resinsStatistical methods in the study of inclusions
Work placement	Not applicable

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