

学会誌 No.	年月 year	名前 author(s)	題目 title	ページ page(s)	英文要約 abstract	キーワード英語 key words (English)	キーワード(日本語) key word (Japanese)	メモ
No.26	1981	Akira, TERADA	Identifying GONZETSU	1-14	<p>Gonzetsu is a term which appears in many ancient Japanese documents, but until recently its true meaning and connection with "Koshiabura" were a mystery.</p> <p>At least five potent theories have been offered as a solution to this mystery.</p> <p>1) Gonzetsu refers to the sap of the tree <i>Acanthopanax sciadophylloides</i> Fr. et Sav. (Japanese name, "Koshiabura").</p> <p>2) Gonzetsu was the name of the best quality varnish made from the sap of the lacquer tree <i>Rhus verniciflua</i> Stokes.</p> <p>3) Gonzetsu was a baking varnish made from Japanese lacquer for the rust proofing of metallic antiquities.</p> <p>4) Gonzetsu was a purified drying oil made from plant seeds and used in oil paintings.</p> <p>5) Gonzetsu was the <i>Ōshitsu</i> or sap of the tree <i>Dendropanax morbifera</i> Lev. (Japanese name, "Kakuremino").</p> <p>Our research on the Gonzetsu mentioned in many ancient written records, and field work investigations of <i>Ōshitsu</i> in Korea, have shown that until the middle of the Heian period, this name Gonzetsu referred to the sap of Koshiabura trees in Japan and was later called by the Japanese name Koshiabura. Furthermore, the <i>Ōshitsu</i> produced in Japan might have been used as a Gonzetsu as was done in Korea, where <i>Ōshitsu</i> was used as a Gonzetsu from the Kuclara (Baegje) Dynasty until the end of Lee Dynasty.</p> <p>However, from the end of the Heian period in Japan, Makie techniques improved greatly. After that time the name and meaning of Gonzetsu have changed into Kinshitsu, which was an Urushi paint used in golden lacquer ware finish. Today, <i>Nashiji Urushi</i> is the Kinshitsu. This is a transparent yellow varnish made from Japanese lacquer of the best quality.</p>			
No.26	1981	Etsuzo, MATSUI	The Appearance of Koshiabura in Ancient Documents	15-23	<p>In ancient times Japan lacquer was the substance most often used to paint or varnish articles in Japan. Occasionally, however, the word "Koshiabura" appears in ancient documents. It seems that this "Koshiabura" was a varnish different from Japan lacquer and was used mainly on metal articles, but today it is not known what "Koshiabura" precisely was. A study of ancient documents, however, has resulted in the following list of articles covered with "Koshiabura".</p> <p>1) Koshiabura Articles Mentioned in Shōsōin Records</p> <p>According to an index of articles stored in the Shōsōin in 756 A. D., including personal articles of the Emperor Shōmu and Buddhist articles from the opening of the Todajji Temple, a total of 75 items were covered with Koshiabura: 2 gold articles, 1 silver article, 2 gold plated copper articles, 27 copper articles, 1 steel sword, 41 iron suits of armor and 1 article made of wood. Unfortunately, shortly thereafter many of these articles were taken out of the Shōsōin to help put down a rebellion, and then replaced by different articles. Today, the only article covered with Koshiabura found by the author, that appears on the original list, is a unit of ten small swords used by the Emperor Shōmu on official occasions.</p> <p>2) Koshiabura Articles in the Ritsuryō Code</p> <p>2-1: According to the <i>Ryō-no-gie</i>, written in 833 A. D., each person of the Seicho rank was allotted 7 shaku (125cc) of sesame oil, 7 shaku of hempseed oil, 1 go (180cc) of perilla oil, 3 shaku (0.054cc) of Japan lacquer, and 3 shaku of Koshiabura.</p> <p>2-2: In the <i>Engishiki</i>, written in 927 A. D., Koshiabura is mentioned 14 times; 5 times in connection with the areas producing Koshiabura, 7 times in relation to weapons and armor, once in connection with a wooden chest, once regarding a gift to the Emperor of China, and twice in connection with unknown uses.</p> <p>3) Koshiabura Articles in the Shoku-Nihongi</p> <p>In the <i>Shoku-Nihongi</i>, one of Japan's most reliable ancient historical documents, Koshiabura is mentioned only once. It states that in Hōki 8 (777 A.D.) an emissary from the kingdom of Bokkai took back with him as gifts for his king, silk cloth, silk pongee, silk thread, silk wool, gold, mercury, koshiabura, Japan lacquer, camellia oil, Buddhist rosary made of quartz crystals, and fans made of betel palm leaves.</p>			

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No.26	1981	Kiyoshi, HIRABAYASHI	The Deterioration and Preservation of Silk Fabrics	24-34	<p>Most of the ancient dyed silk fabrics are now physically weak. The reasons for this can be explained in terms of the physical properties of original raw silks as well as the rate of deterioration that had taken place under various environmental conditions.</p> <p>The physical properties of old silks were studied by raising various strains of silkworm, used long ago and still in existence, and testing the raw silk obtained from their cocoons. These studies show that cocoon filaments used in the late Edo period (1800-1868) were short (300-400m) compared with those of silkworm strains used today (up to 1500m), and had a tenacity of 3-4 g/ d, an elongation of 21-22%, a Young's modulus of 1000-1100 g/mm², and a thickness of 1.5 d. Filaments used in the early Meiji era (1868-1890) had a tenacity of 1.4 g/d and an elongation of 5%.</p> <p>On the other hand, an examination of filaments obtained from silk fabrics woven in the Momoyama-Early Edo period (1596-1644) showed that they are now physically very weak with a tenacity of 1-2 g/d and an elongation of 4-9%. These results indicate that the conditions under which silk fabrics and cocoons are preserved strongly influence the physical properties of the filaments.</p> <p>For instance, when raw silk was kept at room temperature and at various levels of humidity, its physical properties deteriorated more rapidly under the higher levels of humidity. The viscosity of the deteriorated silk also dropped to about a half of that of the original silk.</p> <p>This deterioration is probably the result of the fission of peptide bonds in the tryptophan moiety of silk since a compound of indole moiety was found in alcoholic extracts obtained from the deteriorated silk.</p>			
No.26	1981	Seiju, YAMAZAKI	Vegetable Dyeing in Japan and Some Problem in the Future	35-42	<p>The term "Kusakizome" literally means in Japanese a dye made from grasses and trees. In other words, it refers to a kind of vegetable dye process, which, as is commonly known, was the way fabrics were dyed before the invention of synthetic dyes.</p> <p>During the depression years in Japan before the war, various commercially viable plant dyes were developed by Akira Yamazaki as a side business for silkworm farmers in Nagano Prefecture hit hard by the fall of silkworm cocoon prices. At the 1st Exhibition of Dyed & Woven Fabrics held at the Ginza Shiseido Hall in Tokyo, a new word was coined for his style of dyeing- "Kusakizome."</p> <p>This author became involved with Kusakizome in 1946, and ever since then has been devoted to developing new practical dyes acceptable to modern tastes. The first problem in developing such dyes was ensuring that the dye did not change colour or fade. After many experiments "nizome" (boiling) and "mushi" (steaming) proved to be the best way of applying dyes to cloth, and it became dear that oxidation is very important in fixing pigments in Kusakizome. There was also the problem of dye catalytic agents. Since the use of chemicals can lead to pollution problems, research was conducted on strong dyes that could work without chemicals, and after extensive experiments, new dyestuffs were developed from south sea and tropical materials.</p> <p>In 1979 a 16 mm film entitled "The Beauty of Kusakizome" was made which gives a clear description of Kusakizome and the research work of the author. It explains the dyeing techniques of Murasakizome, Akanezome, Benihanazome, Aizome and other Kusakizome colours, and shows the entire Kusakizome process from the collection of dyestuff materials to the completion of the final product.</p>			

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No.26	1981	Fumi, YAMAUCHI	Identification of the Woods by Anatomical Characters and Woods used for Canoes, Bows and Coffins Excavated from Japan	43-59	<p>The best method of identifying wood used in ancient artifacts found in archaeological excavation sites is one which analyses the wood's structure. Some wood structure groups have very clear characteristics in their family or genus, but there are also some which look alike yet are really very different. Therefore slide (microscopic specimens) of the woods being examined should always be available for comparison tests.</p> <p>Proceeding on this basis, the author has compiled a list (tables 1-4) of the excavation sites and types of wood used in canoes, wooden bows, and wooden coffins examined up until now.</p> <p>Most of the canoes were excavated from sites in the Kanto Plain, and most of them were made of Kaya (<i>Torreya nusenifera</i> Sieb. et Zucc.). Ancient wooden bows found all over Japan were usually made from branches of <i>Inugaya</i> (<i>Cephalotaxus harringtonia</i> K. Koch). Wooden coffins were excavated only in the Kinki area and its surrounding regions, and the most frequently used material was <i>Koyamaki</i> (<i>Sciadopitys verticillata</i> Sieb. et Zucc.). With only two or three exceptions, the trees used to make the above artifacts were all native to the regions in which the artifacts were found.</p>			
No.26	1981	Takatsugu, MATSUDA	Botanical Identification of Wooden Wares Excavated in the Soil of the Yayoi-age	60-73	<p>Identification of wooden wares used by peoples of the Yayoi age (300_{B.C.} - A.D. 300) were carried out in several sites of Japan.</p> <p>Further, the distribution of kinds of woods from which respective wares were made, such as spades, hoes, and axes, adzes and bows.</p> <p>Most of spades, hoes, are made of oak, and adzes are made of <i>Cleyera japonica</i> Thunb. (<i>sakaki</i>) and oak. But kinds of woods of bows seem dependent on each district, where they were excavated. For examples, those of <i>Cephalotaxus harringtonia</i> K. Koch (<i>inugaya</i>) are known in the Kanto-district, and some places of Kinki-district, and <i>Torreya nucifera</i> S. et Z. (<i>kaya</i>) are done in some other places of the Kinki-district and also in some places of Kyushu district.</p>			
No.26	1981	Nobuyuki, KAMBA	Identifying Repainted Areas in Oil Paintings	74-80	<p>Before cleaning or restoring old oil paintings, repainted areas can be identified and considerable information can be obtained by using X-ray radiography and UV fluorescence photography. However, when it is necessary to have more exact information about underlying paint film in a repainted area, it is better to take a paint sample and examine the cross-section. This method will also provide information concerning painting methods, paint thickness, and the exact composition of various superimposed films.</p> <p>It should be emphasized, however, that micro samples should not be taken from pictures indiscriminately. It must be done only as a last resort when all other methods of settling questions fail, or when no other method is applicable.</p>			
No.26	1981	Takashi, KADOYA	On the Permanence of Paper	81-88	<p>It is well known that the properties of paper, both physical and chemical, change over long periods of time.</p> <p>This report discusses the permanence of paper, which was treated under various temperature, humidity, illumination and atmospheric conditions, from the point of view of 1) paper discoloration, 2) the paper's loss of strength, and 3) chemical changes, such as an increase in the copper number, a decrease in alpha cellulose, or a decrease in cuprammonium viscosity.</p> <p>In spite of much research work, and even though the factors which cause aging are fairly clear, it is still impossible to predict with precision the permanence of individual paper samples using artificial tests. In a recent paper, Lunner stated that accelerated aging tests should use not only dry heating tests, such as ASTM and TAPPI tests, but also heating tests under moisture conditions, since the natural aging of paper usually occurs with some moisture in the paper sheet.</p> <p>This report also gives a critical review of several points of view concerning the permanence of paper.</p>			

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No.26	1981	Hachiro, MORI; Hideo, ARAI (Preliminary report)	Protecting Underwater Cultural Properties from Marine Borers	89-95	<p>The authors are engaged in an investigation of how to protect underwater artifacts and cultural properties, such as the sunken ship Kaiyo Maru and the wooden pillars of the O-Torii, or Great Gate, of the Itsukushima Shrine, from the harmful effects of marine borers. In the case of the O-Torii, which requires urgent attention, the authors are experimenting with two basic methods of control ; a wood treatment method using various comparatively stable organotin compounds, which adhere well to wood fibers underwater, and a fumigation method using the insecticidal fumigant methyl bromide (CH₃Br). The following is a preliminary report on the results of these experiments.</p> <p>Fumigants are commonly used against insects and rats, but their use against Mollusca and Crustacea is probably unprecedented. The big advantage of fumigation methods is that they have no residual toxicity, and do not pose the danger of contaminating fish and shellfish' living in the area with poisonous substances. If successful, fumigation will be an epoch-making method of marine borer control. At present, the authors believe that fumigation should be carried out periodically, that is twice a year in spring and autumn. In the experiments now being conducted, which use short-necked clams and acorn shells as test samples, results show that fumigation can be just as effective as when used against insects.</p>			
No.26	1981	OBITUARY	In Memory of Dr. Takakage SAKURAI, the Auditor of the Association	96-97				
No.26	1981	<Information from the Association>		98-102				
No.27	1982	Tadaki, MIYOSHI; Motoji, IKEYA	Fluorescence of Oil Colors under N ₂ Laser Excitation and Its Application to the Identification of Pigments and Dyestuffs	1-7	<p>A study of the fluorescence of oil colors subjected to pulsed laser excitation was made using an N₂ laser $\lambda = 337.1$ nm, pulse duration = 5 ns) to measure the fluorescence spectra in various oil colors.</p> <p>The fluorescence spectra (spectral shape, peak wavelength, and peak intensity) observed were different for different pigments. Therefore, these spectra can be used to identify pigments in oil paints. For instance, the pigments in the red parts of an oil painting can be determined by measuring their fluorescence. spectra Consequently, oil painting forgeries can now be detected through this kind of pigment investigation since different pigments have been used in different times in history, and therefore produce distinctive spectra. The advantages of this laserinduced fluorescence method are that it is a non-destructive method and can be applied to pigments and dyestuffs.</p>			
No.27	1982	Etsuzo, MATSUI	On the Oiled Silk Clothes, recorded in Engi-shiki	8-11	<p>In Engi-shiki (old documents, 927 A.D.), oiled silk clothes are noted to be used as rain covers of outdoor furnitures and moisture-proof packages of drugs. There are also description about raw materials for making oiled silk clothes. The author interprets the process of making oiled clothes as follows.</p> <p>(1) Raw perilla oil is pre-polymerized by long time heating in kettles with woodfire.</p> <p>(2) This pretreated oil is spread on silk cloth.</p> <p>(3) The oil on silk cloth is exposed in air ; as the result, the oil, absorbing oxygen in air, changes from liquid to solid flexible film.</p> <p>(4) This phenomenon is the oxy-polymerization of unsaturated fatty oils, the resulted solid flexible film being named "Linoxyn" in modern chemistry.</p> <p>(5) The resulted oiled silk cloth in those days may be comparable to the oiled paper of Japanese lantern and umbrella of the present day.</p>			

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No.27	1982	Yuji, SANJO; Takeshi, TOMINAGA	Segregations of Elements in Ancient Chinese Coinage	12-17	Ancient Chinese metal coins were presumably made by casting since casts were sometimes excavated in ruins. In order to study the segregation of elements in coinage probably caused during the casting process, sixteen sample pieces were taken for analysis from different parts of each coin. Ten elements (Cu, Pb, Sn, As, Fe, Sb, Zn, Ni Co and Mn) were determined by means of the inductively coupled plasma optical emission spectroscopy. Appreciable segregation of major elements was observed in the ancient bronze coins : copper was accompanied by tin but not by lead. By contrast, segregation of elements was much less pronounced in the brass coins. Based on the correlation diagram of Fe-Sn contents, sample pieces taken from one bronze coin could be distinguished from those from another. With the Fe-Ni correlation diagram each brass coin could be distinguished from another.			
No.27	1982	Tatsuo, KATOU; Kenichi, AKIYAMA; Takeo, KADOKURA	Analysis of Air Pollution by Verdigris Components	18-28	The verdigris on copper structure is generally made up of basic copper carbonate. However, it becomes to contain sulfate or chloride through the air pollution. Therefore, the influence of air pollution could be evaluated by means of analyzing the verdigris composition. Recent progress of ion chromatography made possible the microanalysis of sulfate, chlorine and nitrate ions. Authors collected and analyzed a few mg of verdigris on roofs, water pipes, bronze statues and so on. As a result of this survey, it was found that (1) the samples from the non-polluted area contained roughly the same amount of carbonate, (2) the average concentrations of sulfate and chloride were comparable, (3) sulfate predominated in the samples from the industrial area, (4) chloride would probably have originated in materials from roads or the sea.			
No.27	1982	Takeshi, TOMIZAWA; Haruo, SATO; Takeshi, TOMINAGA	Neutron Activation Analysis of the Jōmon Earthenware from the Excavated Site at Kasori	29-37	Instrumental neutron activation analysis can be successfully applied to archaeological artifacts because of its ability of rapid and simultaneous multielement analysis. In this study instrumental neutron activation analysis has been used for determination of 14 elements: aluminum, sodium, potassium, titanium, magnesium, manganese, iron, vanadium, cobalt, scandium, lanthanum, europium, ytterbium and thorium. The data were treated statistically according to Euclidean distance and factor analysis. To classify earthenware samples by chemical composition, iron, manganese and cobalt are found to be most useful. Based on the contents of these elements, early Jomon earthenware could be characterized. It was shown that early Jomon earthenware (Kayama Type) was probably made using a local clay bed different from others. From the profile analyses, it was suggested that a representative sample should be taken from the center layer of earthenware to avoid alteration and weathering effects.			
No.27	1982	Sadatoshi, MIURA; Takeshi, TOMISAWA; Rikuo, ISHIKAWA	Effect of a Sheltering Construction to protect Stone Sculptures from Deterioration by Freeze-Thaw Cycle	38-42	Several cycles of freeze and thaw easily destroy a porous stone such as tuff often used for sculptures and buildings in Japan. One of the ways to protect stone objects from such destruction is to shelter them. The author studied the effect of a sheltering construction (temple) for stone sculptures of Buddha at "Ohya" in Tochigi Prefecture. As the temperature of the stone surface in the temple was almost constant while the outside temperature fell below freezing point, the sheltering construction was effective to protect the stone sculptures from its destruction by the freeze-thaw cycle. The stone surface temperature differed from one location to another. The tendency was classified by the cluster analysis.			
No.27	1982	Kōzō, HAYASHI	Preface to the Special Issue on Old Textile Properties	44				
No.27	1982	Rokuro, UEMURA	Research on the Treasured Garment of Shitenno-ji Temple Said to have been worn by the Prince Shōtoku	45-49	The red garment kept in Shitenno-ji as the temple's most treasured object is a hō coat said to have been worn by the Prince Shōtoku. The present article confirms that the red color of the hō coat was dyed in the decoction of Japanese madder (<i>Rubia cordifolia</i> L. var. <i>Mungista</i> Miq) with using lye mordant.			

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No.27	1982	Hyobu, NISHIMURA	On the Twilled Pattern of the Red Hō Coat in Shitennō-ji Temple	50-53	The present article makes it clear that the twilled design seen on the garment mentioned in the preceding article "Research on the Treasured Garment of Shitennō-ji Temple Said to have been worn by the Prince Shotoku" is composed of various floral motifs.			
No.27	1982	Maresuke, KASHIWAGI; Seiju, YAMAZAKI	The Lightfastness Properties of Traditional Vegetable Dyes	54-65	Dyed cotton and silk cloths are prepared by using traditional technique, to investigate the lightfastness properties of vegetable dyes. Both xenon light under controlled condition and open sunlight methods are used according to JIS. The color difference is expressed by an CIE formula based on the measurements of three stimulus values and also by JIS grade. For dyed test pieces after controlled light exposures with a Xenon Fademeter and open sunlight, both three stimulus values and JIS blue scale were estimated and the color differences between original specimens and deteriorated ones through light exposure were calculated according to CIE formula. The remarkable influences of atmospheric humidity and the character of fibric components of cloths themselves are easily observed and dyes can be classified into four groups according to the rate and the degree of their deterioration. The unique behavior of "Kihada" dye is also observed.			
No.27	1982	Atsuko, HIRAOKA	Spectrophotometric Characteristics of Ancient Yellow Papers and their Fading Behaviors	66-74	In Japan, vegetable dyes have been used for coloration of papers from ancient times ; for instance, the Buddhist scriptures were often dyed yellow with plant dyes, and a lot of colored papers are preserved nowadays in most museums. Of course, spectrophotometric investigation of ancient colored materials provides an effective tool for their characterization, yet the fading of colors in themselves strongly disturbs an exact identification of individual dyes, in general. In this work the fading process of Japanese yellow dyes, Kihada, Kariyasu, Kuchinashi and Ukon, were investigated in detail by the use of two types of spectrophotometers. The results of identification of dyes for 9 ancient colored papers are also described.			
No.27	1982	Sae, OGASAWARA	Preservation, Display and Restoration of Ancient Colored Textiles	75-83	It is a great mission of the museum to preserve cultural properties of the past as well as to show them to the public, however it seems that the pursuance of one end contradicts that of the other end. Especially, textiles are in nature fragile and of low durability so that they are harmed bit by bit by the exhibitions they participate. The author discusses here desirable methods of preservation and display to maintain old textiles in the state feasible to be displayed with least harm under the three headings shown below : 1. Display and preservation The method of present display and its problem are discussed and further, desirable environment for display in future is stated. 2. Preservation and repair Repairs done in the past are discussed. 3. Repair of Kosode dresses Essentials concerning Kosode dress repair are discussed.			
No.27	1982	Masao, HASEGAWA	Concerning Dyestuff produced in Dried and Fresh Roots of MERCURIALIS LEJOCARPA (short note)	84-86				
No.27	1982	Atsuko, ITO	'Hiko' a Water-soluble Red Powder used in 'Nagaita Chugata' Dyeing Technique (short note)	87-89				
No.27	1982	Katsuhiko, MASUDA; Atsuko, ITO	Guide to the AATA Abstracts on Textiles	90-91				

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No.28	1983	Akira, TERADA; Ktiichiro, TERADA	An Estimation of the Real Quantity of "Dai-Shō ", from "Shitsukohei, the Capacity is Three Shō and a Half" in the Nara Period	1-9	Shitsukohei in Shōsō-in, Nara, is a ewer made with Japanese lacquer and a national treasure of Japan. The Emperor Shōmu used it during an age in the Nara period. Tōdai-ji Kenmotsu-cho, an ancient Japanese document, records that Shitsukohei can receive three shō and a half. The real volume scale in such an ancient age is unknown and mysterious at the present time. From the detailed figures of Shitsukohei reported by Kimura, we have succeeded in calculating its volume and got a value of 2, 780 ml. After finishing our studies, we found out a report by Matsushima who had already made a survey of Shitsukohei and got 1.52 shō (2,742 ml) as its capacity. According to the above mentioned results, we have experimentally and statistically estimated the real quantity of three shō and a half in the Nara period, and obtained a conclusion that the quantity had to be within the range from 2,639 to 2, 883 ml/ with the confidence interval of 99%. This result determines that the Dai-shō regulated by the law of Taiho in the Nara period was in the range from 4.18 to 4.57 gō and therefore the mean value was 4.37 gō. These conclusions agree well with the result of 4.33 gō that was deduced by Hirokata YASHIRO (A. D. 1758-1841), who judged the quantity by his own study on the ancient Japanese and Chinese law systems.			
No.28	1983	Mitsuyoshi, KUREYA; Hiroshi, OKABE; Tadao, KANeko	The Investigation of Old Sculptures in Gunma Prefecture (I)	10-19	The object of this investigation is to observe the internal structure of old sculpture and to measure the sizes and positions of the nails used inside. For this purpose, the analytical X-ray photogrammetry has been studied at Gunma Technical College for several years. This report describes the application of analytical X-ray photogrammetry to wooden Buddhas, BISHAMONTEN & FUDOMYOO of Chokoku-zi at Gunma pref.			
No.28	1983	Ryuitiro, SUGISITA	On the Pigments Used in Murals of Thai Buddhist Temples	20-25	Pigment and wall mortar materials used in mural paintings of nine Thai Buddhist temples, about one or two hundred years ago, were analyzed qualitatively by micro scale analysis, X-ray fluorescence, X-ray diffraction and IR-spectroscopic methods. Vermilion, green verditer, lead white and calcium carbonate were found out although the whole amount of pigment samples taken from murals were small. Calcium carbonate was also detected in murals as a mortar component. The most interesting result of the investigation is the presence of SiO ₂ as white pigments in paintings of Wat Nonbua, Nan, North Eastern Thailand.			
No.28	1983	Hisao, MABUCHI	Preface to the Special Issue on Conservation of Metals	27				

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No.28	1983	Mitsuyoshi, KUREYA; Sadatoshi, MIURA; Akinobu, OSAKI; Tadao, KANEKO	Characteristic Curve of X-ray Film to Bronze and Japanese Cypress	28-37	<p>Radiograph is very useful technique for the investigation of the inner structures of old sculptures and bronze statues. For this study the photograph ought to be not only clear but also have a wide range of density which corresponds to various differences in thickness of the objects.</p> <p>However we have few data to decide the optimum condition of the radiograph (film, X-ray voltage, ampere, exposure time and distance) for cultural property, though there are considerable amounts of this kind of data for medical and industrial purposes.</p> <p>The authors made examinations on the relation between the thickness of the test pieces (bronze and wood-Japanese cypress) and the density of the photograph by changing the conditions. From the results they recommend the following condition as a reasonable one.</p> <p>1. BRONZE OBJECTS</p> <p>a) For normal objects (thickness T varies from 0 to 20 mm) film : Fuji Medical X-ray film (RX) voltage : 260-300 kV p ampere : 5 mA time : 5 min. distance : 120 cm</p> <p>b) For thin objects (thickness T<15mm) film : Fuji Medical X-ray film (RX) voltage 180-220 kVp ampere 5 mA time 3-4 min. distance : 120 cm</p> <p>c) For thick objects (thickness T>15 mm) film : Fuji Industrial X-ray film (IX 80 or IX 100) voltage 300 kV p ampere 5 mA time 10 min. (7-8 min for JX 100.) distance : 120 cm</p> <p>2. WOODEN OBJECTS film : Fuji Medical X-ray film (RX) voltage 40 kVp ampere 5 mA time 2-3 min. distance : 300 cm</p> <p>Note : The characteristic curves of X-ray films here are represented as follows; T (Y-axis) : thickness of material D (X-axis) : diffuse visual density Parameters : peak tube voltage V p tube current I exposure time t distance between the film and X-ray source H</p>			
No.28	1983	Takeshi, TOMIZAWA; Sakae, NIYAMA; Takeshi, TOMINAGA	Energy Dispersive X-ray Fluorescence Analysis of Bronze Artifacts	38-43	<p>For non-destructive chemical analysis of bronze artifacts, the energy dispersive X-ray fluorescence method has been applied to determine the quantity of Cu, Sn and Pb owing to its ability of rapid and simultaneous multi-element analysis. An ^{241}Am source for excitation and Si(Li) detector connected with 1024 channel pulseheight analyzer were used for the analysis. Bronze alloy was melted by heating for about 15 minutes at 1200°C in the atmosphere. The effect of crystallizing differentiation of the major elements was investigated while the bronze alloy was melted repeatedly. The standard deviations for the Cu, Sn and Pb contents during seven successive melting processes were 0.7, 1.1 and 7.4%, respectively. The results of analysis indicated that the concentrations of major elements remained nearly unchanged throughout the repeated melting procedures.</p>			

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No.28	1983	Yuji, SANO; Kenji, NOTSU; Takeshi, TOMINAGA	Studies on Chemical Composition of Ancient Coins by Multivariate Analysis	44-58	<p>Ancient Chinese, Japanese and Korean coins were analyzed to study the relation between the chemical composition and archaeological significance. Seven elements (Cu, Pb, Zn, Fe, Ni and Mn) were determined by inductively coupled plasma optical emission spectrometry and six elements (As, Sb, Co, Au, Ag and Se) by instrumental neutron activation analysis.</p> <p>Bronze coins contain as major constituents Cu, Pb and Sn approximately in the ratio 7:2:1. Trace elements were classified into two groups according to the concentration. The trace elements in lower concentrations (Ni, Ag, etc.) showed the normal distribution over the logarithmic concentration and were attributed to contaminants from natural materials. The cluster analysis based on 13 elements could not recognize each bronze coin but classified the coins into five groups. The quality of coins from Sung dynasty became deteriorated as they were casted later in that period.</p> <p>Major constituents of brass coins were Cu and n. The ratio of their contents was 7:2 in Japanese coins and 1: 1 in Chinese coins. As compared with bronze coins, brass coins contained more As, Sb and Fe but less Ag and Se.</p>			
No.28	1983	Kazuo, YAMASAKI	Chemical Analysis of the Bronze Spire of the Horyuji Pagoda carried out by T. Dono and G. Nakagawa	59-64	<p>A five-story pagoda of the Horyuji temple near Nara, which had been built in the 8th century is one of the oldest wooden buildings survived. During the repair work carried out in 1943-1952 31 samples from the various parts of the bronze spire (see Table 1 and Fig. 1) were analyzed by T. Dono and G. Nakagawa, Nagoya Institute of Technology. The results of analysis which have remained unpublished are presented in this paper. The parts (Nos. 5-25) made in the 8th century contain small amounts of lead, whereas those made during the repair of the 9th year of Genroku (1696) (Nos. 1-4) have large amounts of lead. The former parts resemble in chemical compositions the Great Buddha in Nara which have been made in the 8th century. Arsenic which is found in all the samples seems to have been added intentionally. Lead isotope ratios (Fig. 2) of the samples remained (Nos. 2, 20, 22, 23, 25, 26, 27, 28 and 29) show that these spire parts are made of Japanese lead ores. The reason why two samples (Nos. 23 and 27) show the values deviating from those of the Japanese lead ores is not clear yet. Further investigation including redetermination of the lead isotope ratios is required. Northern Sung coins which had been imported and used to cast bronze statues seem to be not related to a large content of lead in sample No. 2 (see Fig. 2), because their lead isotope ratios are different.</p>			
No.28	1983	Hisao, MABUCHI; Yoshimichi, EMOTO; Yoshimitsu, HIRAO; Shingo, KITADA; Kan, KIMURA	Lead Isotope Study of Two Copper Artifacts in Asuka-Nara Periods	65-69	<p>Lead isotope analysis was carried out for two copper artifacts recently unearthed in Japan. One is a copper epitaph of Yasumaro OHNO, famous biographer in the Nara Period, dated 723 A. D. and the other a copper Buddha image of the Asuka Period (latter half of the 7th century A. D.). Lead isotope ratios of both objects indicated Japanese origin of the material ores. These materials seem to be of the earliest stage of mining and metallurgy in Japan. The results of the X-ray fluorescence, atomic absorption and neutron activation analyses for the Buddha image are also given.</p>			
No.28	1983	Yoichi, NISHIYAMA	The Conservation of Unearthed Iron Objects	70-77	<p>In Japan the study on the conservation treatment of unearthed iron objects started in 1964 and has since been developing. The treatment consists of impregnation and coating with acrylic resin for consolidation and prevention from corrosion.</p> <p>However, it has problems as follows :</p> <ol style="list-style-type: none"> 1. To what extent should we clean and restore the objects from the archaeological point of view? 2. How can we remove salts and impregnate the objects fully with resin? 3. How should we use the results of scientific researches for restoration? <p>We could conserve iron objects in good condition if we treat them with successive way from the excavation to the exhibition :</p> <ol style="list-style-type: none"> 1. "First aid" treatment just after excavation by archaeologists 2. Restoration treatment by restorer with the aid of scientists 3. Careful keeping and exhibition in museums by curator 			
No.28	1983	Takeshi, TOMIZAWA	[Data] The Chemical Composition of Bronze Sculptures	78-81				

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No.29	1984	Cheon-in, RYOO; Yoshiyuki, INOUE	The Moisture Content of Wood under the Floors of Shrines and Temples in Relation to Microbial Deterioration of Wood	1-8	<p>Wood-inhabiting fungi may be classified into three groups according to the nature of development in and on wood: the wood-rotting fungi, wood staining fungi, and molds. Some kinds of woods are susceptible to attack by a number of fungi and it is not uncommon to observe two sorts or even more of fungi developing on a single wood, while moisture required by individual fungi is very variable.</p> <p>This study aims at investigating moisture content of wood and identifying the genus of molds concerned under various conditions. The cases studied are as follows: the Eirin-ji temple (ca. 150 years old, Niigata prefecture), Ichinoya shrine (Tsukuba academic town, Ibaragi prefecture), Ichinoya yasaka shrine (ibid., and Suwa shrine (ibid)). The investigation of the Eirin-ji temple started in the beginning of December 1982. The species of wood used for the floor post and foundation were mainly <i>Chamaecyparis obtusa</i> Endl. and partially <i>Zelkova serrata</i> Makino. Moisture condensation was observed on the surface of the foundation. The study of fungi from the three shrines was carried out all through the year of 1982. Sixteen genera of molds were identified after isolating fungi collected from the surface of wood by Scotch tape method.</p> <p>In general, the moisture content of floor posts varies with a function of the distance from the surface of the foundation stone. The lowest moisture was observed at 50 cm apart from the bottom of the floor post. The highest moisture content was about 40% for both the floor post and the foundation. It was observed that a moisture content which exceeds considerably the fibersaturation point of wood enhances the development of wood-rotting fungi. The growth of fungi is retarded in wood of 25 to 30% moisture content and completely inhibited below 20%. Dew formation on the surface of the foundation stone raises the moisture content of wood. In the case of floor posts, the development of mold growth may be intermittent because of their alternate wetting and drying.</p>			
No.29	1984	Torao, OHTSUKI	Studies on the Procedures Used for Protection of Art Objects from Fungal Damage (II)	9-17	<p>In the preceding paper, methods for steeping and fumigation were studied, and the fumigation with formaldehyde was found to be the most effective among other methods under various combination of chemicals. In this case, however, disadvantage in formalin-fumigation lies in that the drug contains about 60% water, since the presence of moisture has a deleterious effect, especially on art objects to be fumigated.</p> <p>In this experiment, fumigation with paraformaldehyde was tested in order to avoid the moisture effect. The evaporation of this substance is so tedious that it requires heating under reduced pressure. The fumigation apparatus as shown in Fig. 1 were found to be quite effective. For complete sterilization, 20-50 g/m³ were required for common fungi, and 50-70 g/m³ for tonophilous fungi. The data for sterilization refer to Tables 1 and 2. During the experiment, another disadvantage were encountered, that is, paraformaldehyde may crystallize out when more than 20 g/m³ were applied for fumigation as seen in Table 2. To avoid such an inconvenience, a paraformaldehyde paper method was devised by the author for the following reasons; 1. No spore germination occurs in the presence of a minute amount of paraformaldehyde gas, but a complete killing of spores occurred in no case. 2. The presence of fungal spores at their resting stage causes no damage to the art objects. Some examples may be seen in Tables 4, 5 and 6.</p> <p>Using this method, spore germination on lenses and prisms has been carefully checked. Even after 20 years, all glassy parts were entirely free from cloudiness resulted from fungal growth (Figs. 2 and 3).</p>			

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No.29	1984	Kenzo, IGAKI	Investigation on High Quality Ancient Iron	18-26	<p>Through the measurement of anodic polarization curve, very big differences on the corrosion-resistant properties are clearly observed between the high quality ancient iron and the present day's technology iron, mainly due to the soundness of the passivation film formed on the specimen surface. Composition analysis shows the substantial differences are the concentration of manganese, silicon and sulfur, usually in the level of several tens of weight ppm for high quality ancient iron, far less than that for technology iron. Superior corrosion-resistant properties are observed on the specimen prepared by a traditional iron making process using a clay furnace of nearly one meter in height. This process has been kept in secret in the family group named Kurabayashi for several hundreds years at least. In spite of the low carbon concentration (ca. 0.4 wt% on the average) carbon is in the form of vermicular graphite. This peculiar Kurabayashi iron is not only corrosion-resistant but also easily workable. Recent technology succeeded in diminishing the sulfur concentration to the level of a few weight ppm on technology iron. The next step to approach the high quality ancient iron would be to decrease the concentration level of manganese and silicon.</p>			
No.29	1984	Yoshimitsu, HIRAO; Akito, IZUTANI; Kenji, YAGI; Kan, KIMURA; Hisao, MABUCH	Chemical Compositions of Western Han Coins and Imitative Chinese Coins	27-34	<p>Chemical compositions of 8 Western Han coins (Wuzhu coin) and 8 Chinese coins of later periods (one authentic and seven imitative) were analyzed by means of neutron activation and atomic absorption methods. The chemical compositions of the 8 Wuzhu coins were found to be similar to each other and quite different from the coins of Tang dynasty and later periods. The average contents of Cu, Pb and Sn are $81.5 \pm 1.8\%$, $13.2 \pm 1.2\%$ and $2.6 \pm 0.7\%$, respectively. The imitative coins were very variable in chemical composition and were mostly out of the range of Chinese coins. The authentic Chinese coin, Wan-li Tong-bao (1573), was found to be in brass and is one of the earliest examples of the use of Zn in Chinese coins.</p>			
No.29	1984	Sadatoshi, MIURA; Akinobu, OSAKI; Nobuyuki, KAMBA; Mitsuyoshi, KUREYA	An Improvement in Gamma Ray Radiography of Small Bronze Sculptures	35-42	<p>The gamma ray radiography was applied to small bronze sculptures in 1949 for the first time by Toishi. He used ^{60}Co gamma ray source at Tokyo National Research Institute of Cultural Properties. In 1983 a ^{137}Cs source was introduced, because the gamma ray (0.662 MeV) would give a clearer radiograph with an adequate contrast than the gamma ray of ^{60}Co (1.17 MeV and 1.33 MeV). In this report we discuss theoretically and experimentally the optimum thickness of a front lead screen and the best choice of film. A bronze wedge (2 to 32mm in thickness) was used as a test sample. The influence of scattered gamma ray (n) decreased, when the thickness of the front lead screen (X) increased to about 0.3mm (Fig. 3). The thickness giving the maximum radiographic exposure (E) was evaluated as 0.12 mm. The experiment gave the lower value of E (Fig. 6). The reason is supposedly that a part of the secondary electrons emitted by gamma ray penetrated a X ray film, because they had too large energy to be absorbed by AgBr in the emulsion layer. As a result the film was not exposed so much as calculated. The optimum thickness of the front lead screen was evaluated as 0.1-0.3 mm in consideration of the scattered gamma ray and the radiographic exposure. Two types of X ray films were compared: Fuji Medical X ray film (RX) and Fuji Industrial X ray film (IX 100). When a bronze object was small, the IX 100 film gave a good radiograph with the 0.1mm lead screen (Fig. 9). The details can be studied more easily by Fig. 9 than by Fig. 8 (RX film with the 0.03 mm lead screen). A research on ancient small bronze sculptures is now being carried out by this improved method in cooperation with Tokyo National Museum.</p>			

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No.29	1984	Eiichi, TAGUCHI; Ichiro, NAGASAWA; Satosbi, YABUUCHI; Mamiko, TAGUCHI	Investigation of a Wooden Sculpture Using X-ray Computed Tomography	43-50	X-ray computed tomography (XCT) was applied to a wooden sculpture of Buddha for estimation of its inner structure. By analyzing the tomograms we could elucidate easily the complicated structure composed of several pieces of wood and the technique of inserting eyes of rock crystals. The XCT provides informations about details which would not be obtained by X-ray radiography.			
No.29	1984	Tadao, SAEKI; Tadakimi, MIYAWAKI	Characteristics of Modern Tesuki Washi (Hand-Made Japanese Paper) (I)	51-56	<i>Tesuki washi</i> (hand-made Japanese paper) is said to be neutral in pH and suitable for permanent records and documents. However, some defects are pointed out in the case of modern <i>Tesuki washi</i> . We collected 33 pieces of Japanese and Chinese paper and examined if there were some changes in characteristics after artificial ageing tests. It was found that the decrease of M.I.T. folding endurance has a positive correlation with a cold extract pH.			
No.29	1984	Tadaki, MIYOSHI	[Short Note] Laser-Induced Fluorescence of Colors Used for Japanese Painting	57-59	Fluorescence spectra have been investigated for various colors using a pulsed nitrogen laser $\lambda = 337.1$ nm, pulse duration ~5 ns). Fluorescence was observed in most synthetic colors but not in most natural colors.			
No.29	1984	Kazuo, YAMASAKI	Preface to the Special Issue	62				
No.29	1984	Shuji, NINOMIYA; Mamoru, ABOSHI; Yutaro, SAKAKIBARA; Masumi, OSAWA	Mineralogical and Chemical Compositions of Su'e Pottery Sherds from Su'emura Kiln Sites, Osaka	63-73	Mineralogical and chemical compositions (16 elements) of 54 Su'e pottery sherds from Su'emura kiln sites, Osaka, which played an important part in Su'e pottery industry in Japan from the middle 5th to early 9th century A.D., were determined by means of X-ray diffraction and instrumental neutron activation. Combined with the results obtained from thermal analysis and infrared spectrophotometry, firing temperatures were estimated to be around 1,200°C or higher for most of normal grey Su'e pottery sherds depending on their mineral compositions. Re-firing examination of some of the excavated specimens fired at low-temperature was also carried out. Chemical characteristics of Su'e pottery sherds of this district are discussed from the viewpoint of their elemental abundances, especially of trace elements.			
No.29	1984	Yoshihiro, SHIMIZU	Patterns of the Element Constituents of Ceramics from the Kiln Sites	74-82	It is generally known that ceramics found at an ancient or medieval site were very often supplied from different kilns; distributive centers of the pottery. Different groups of potters used various basic clays, but each ceramics have a characteristic pattern of the element constituents according to the kiln where they were fired. In order to determine the patterns the physico-chemical analysis is an effective measure. Here, as the standard for future studies of this kind, ceramic samples from eight kiln sites situated in the western part of Honshu, Japan (the site of Bizen, Katsumata, Tamba, Mino, Sanage, Atsumi, Toyohashi and Tokoname) were examined by the X-ray fluorescence analysis. The significant differences of the patterns among the kilns studied were detected.			
No.29	1984	Tsuneto, NAGATOMO	Thermoluminescent Dating of Earthenwares and Other Related Materials	83-93	Thermoluminescent dating by the quartz inclusion technique, fine grain technique and pre-dose technique is reviewed. The ages for the earthenwares of Ban Chiang, Thailand, were found to be 1210-6390 B.P., and those of the Yosekura cave, Hiroshima prefecture, 1085±35-7590±230 B.P.. The oldest age so far found by the thermoluminescent method in relation to the earthenware is 11840±740 B.P. for the burnt stone found in the Senpukuji cave, Nagasaki prefecture. The ages of pyroclastic flow deposits in the southern Kagoshima prefecture are 5720±920-16400±9400 B. P..			
No.29	1984	Hisao, MABUCHI; Osamu, KAWAKAMI	Strontium Isotope Ratio Applied to the Provenance Study on Potsherds and Roofing Tiles	94-100	Availability of Sr isotope ratios to the provenance studies on ancient ceramics was examined by analyzing roofing tiles and potsherds from five different localities in Japan. It is shown that the $^{87}\text{Sr}/^{86}\text{Sr}$ vs. Rb/Sr diagram gives better separation of groupings than the Rb vs. Sr diagram does. The Sr isotope ratio is also found to be sensitive enough to differentiate otherwise indistinguishable materials fired in a single kiln site.			

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No.29	1984	Setsuo, IMAZU	Restoration of Excavated Potteries with a New Material	101-108	<p>For the restoration of excavated potteries, gypsum has been used exclusively in spite of its some weak points. Recently synthetic resins have come to be employed. The author studied how to assimilate the porous texture of excavated potteries with artificial materials. The new material is a mixture of epoxy resin emulsion, blended chamotte, glass micro-balloon, and a silane coupling agent (γ-Glycidoxypropyltrimethoxysilane).</p> <p>The characteristics of this new material for the restoration of excavated potteries are as follows.</p> <ul style="list-style-type: none"> i. The hardness can be controlled by changing the ratio of the resin and the fillers. Cure time can also be controlled by changing the quantity of the silane coupling agent and the temperature. These advantages contribute to make the molding easy. ii. The texture and the hardness of potteries can be imitated by changing the composition of the components. iii. The strength and adhesiveness of the new material are satisfactory for restoration of potteries, and the restored parts are easily taken off by heating. 			
No.30	1985	Ryu, MURAKAMI; Sakae, NIYAMA	Observation of Coloring Process of "Irogane" Alloy	1-10	<p>"Irogane" denotes the alloys colored by "Nikomi-Chakushoku", which is a traditional Japanese surface treatment using some chemical solution.</p> <p>"Shibuichi" (Cu-Ag), "Shakudo" (Cu-Au) and "Aokin" (Au-Ag) are the representatives of Irogane. These alloys have been in wide use in Japanese metal crafts, especially for the decoration of Japanese sword in Edo period (17-19 C).</p> <p>In this report Shibuichi was mainly described. From the observation with an electron-probe microanalyzer (EPMA) it was confirmed that the coloring process of Shibuichi fundamentally made the best use of the characteristics of eutectic composition of Cu-Ag alloy.</p>			
No.30	1985	Tadateru, NISHIURA; Eddy, DE, WITTE	Drill-boring Test for the Detection of Deterioration of and Consolidation Effect on Stone	11-14	<p>The possibility of a drill-boring test was experimentally studied as a new test method to estimate the deterioration form of and consolidation effect on stone. The curve of the depth of bored hole against the number of drill revolution shows the form of deterioration (see Figs. 1, 3, 4 & 5). As for a consolidated stone, the curve shows the penetration depth and the hardening effect of the consolidant (see Fig. 6). The slope of the curve is an indicator of hardness. However, the value is not absolute because of drill wearing (see Fig. 7).</p>			
No.30	1985	Tadao, SAEKI; Tadakimi, MIYAWAKI	Characters of Modern Tesuki Washi (Hand-Made Japanese Paper) (II)	15-17	<p>The radiography by secondary electron emission ("emissigraphy") was used to the study of the panel painting of late 19th century painted by Baron Kuroda, founder of the Tokyo National Research Institute of Cultural Properties. Before taking the emissigram some experiments were done to know the least amount of radiation energy required to produce a sufficient image as well as the way to decrease exposure. From the results, it is concluded that a 200 kV radiation with a filter of 3 mm tin produces a satisfactory image with the least energy and in the shortest exposure.</p>			
No.30	1985	Taka, YANAGISAWA	Preface to Special Theme on Science and the Study of Paintings	20				

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No.30	1985	Sadatoshi, MIURA	Emissiography of the Painting by Kuroda	21-27	The radiography by secondary electron emission ("emissiography") was used to the study of the Tokyo National Research Institute of Cultural Properties. Before taking the emissigram some experiments were done to know the least amount of radiation energy required to produce a sufficient image as well as the way to decrease exposure. From the results, it is concluded that a 200kV radiation with a filter of 3 mm tin produces a satisfactory image with the least energy and in the shortest exposure.			
No.30	1985	Tadaki, MIYOSHI	Laser-Induced Fluorescence of Oil Colors and Other Materials for Painting	28-33	Fluorescence spectra have been investigated for oil colors using a pulsed nitrogen laser ($\lambda = 337.1$ nm, pulse duration=5 ns) in order to apply a laser-induced fluorescence technique to identification of pigments in oil paints. Fluorescence spectra using the laser are compared with those using a mercury lamp. The nitrogen laser is more suitable than the mercury lamp for identification of pigments. Effects of secular change and exposure to intense light on fluorescence spectra are examined. These effects are not so serious for identification of pigments. Fluorescencespectra of poppy oil, glue and casein are also reported.			
No.30	1985	Tsutomu, WATANABE	Application of Microscope-Television for Conservation and Restoration of Painting	34-36				
No.30	1985	Kazuo, YAMASAKI	Mitsuda-e and the Painting on the Side Panels of the Tamamushi Zushi, Hōryūji	37-40	Mistuda-e is a kind of oil painting which uses mineral pigments mixed with vegetable oil. Ultraviolet light is used to decide oil painting or not, since oil fluoresces strongly under ultraviolet light, whereas Japanese lacquer, Urushi does not. In 1953 the painting on the side panels of the Tamamushi Zushi (small shrine) in the Hōryūji temple has been briefly investigated and found to be Mitsuda-e. The green parts and light brown parts of the painting are painted in oil, whereas the red parts are in Urushi. This result has been confirmed by the recent extensive study of that painting by the Nara National Museum. The oil used in the 7-8 th centuries is perilla oil according to the documentary evidence.			

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No.30	1985	Terukazu, AKIYAMA	Scientific Examinations Applied to the Study of Japanese Painting—Their Beginnings and Some Cautions	41-49	<p>In Japan it was just after World War II that physical and optical analyses using x-ray radiography, infra-red photography, ultra-violet fluorescence and other techniques began to be utilized in the study of ancient Japanese and Chinese paintings.</p> <p>In 1949, the Institute of Art Research, Tokyo charged me with organizing the first group of researchers combining the skills of not only my colleagues in Art History but also those of scientists specializing in these techniques; among them Prof. K. Yamasaki for pigment analyses, and Prof. H. Nakayama for x-ray technology. One of the most important results of these early experiments was the detailed scientific study of the famous <i>Tale of Genji</i> handscrolls in the collection of the Tokugawa Foundation, Nagoya.</p> <p>During the course of these cooperative studies, I had the opportunity to go and study in Paris from August of 1950 until the end of 1951 as one of the first French government grantees after the war. Aside from my studies of Asian art in French collections (especially those of the Guimet Museum), I often visited the Laboratoire du Musée du Louvre headed by Dr. Madeleine Hours. Her principal methodology, above all, consisted in using the results of physical and optical analyses in order to advance Art History studies (i.e. using this evidence to determine technical and stylistic characteristics of major artists' works as well as those of their schools and their time). She did not consider these techniques as simply supplemental to restoration or conservation as was the trend in other countries.</p> <p>Encouraged by these early activities of the Laboratoire du Musée du Louvre, upon my return to Japan, I was able to once again start scientific research on a larger scale thanks to special support from the Ministry of Education of my country. These experiments were performed at the Institute of Art Research, Tokyo (now known as the Department of Fine Arts, Tokyo National Research Institute of Cultural Properties) using the most advanced equipment such as long-wave ultra soft x-ray equipment which was suitable to Japanese paintings and binocular stereo-microscopy.</p> <p>A report on the first phase of our work was published in 1955 and has since been reprinted recently (1984) with supplemental information summarizing the developments in these studies up to today (<i>Kōgakuteki hōhō ni yoru kobijutsuhin no kenkyū</i>, Yoshikawa Kōbunkan). Many new techniques have been added since the first publication such as x-ray fluorescence analysis, spectrophotometry of organic pigments and powerful infra-red television.</p> <p>Nevertheless, in spite of all of these developments one must not forget the principal which we set for ourselves from the start which is that only the strictest collaboration coupled with mutual understanding among art historians and scientists can produce the best results avoiding erroneous and simplistic conclusions.</p>			
No.30	1985	Kazuo, YAMASAKI	Activities of the Conservatin Committee of the Hōryūji Wall Painting during 1939-1945	50-53				
No.30	1985	Seiji, HIGUCHI	Memory of Professor Takakage Sakurai	54-64				
No.31	1986	Hiroshi, KOMATSU; Masakazu, MORIKAWA	Identification of Pearl in the Early Jomon Period	1-10	<p>The authors applied non-destructive identification tests to a shell-like substance (5500 years B. P.) recovered in September 1981 from Torihama Shellmound, Fukui Prefecture. It turned out to be a natural pearl from a fresh-water bivalve. Further, it was proved to be a blister pearl attached to the inner wall of a shell-fish.</p> <p>This report first postulates a definition of pearls and then describes the results of a series of analytical methods applied to this substance.</p>	Pearl, Jōmon period, shell-like substance, nacreous structure, microscope observation	真珠, 縄文時代, 貝殻 様物質, 真珠層構造, 顕微鏡観察	

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No.31	1986	Ryu, MURAKAMI; Sakae, NIYAMA; Masahiro, KITADA	Observation of Coloured Layer of Copper by Japanese Traditional Treatment	11-17	In Japanese metal arts and crafts, some copper alloys are coloured by a traditional surface treatment termed <i>nikomi-chakushoku</i> . These coloured alloys are called <i>irogane</i> ; <i>shibuichi</i> (Cu-Ag) and <i>shakudo</i> (Cu-Au) are the representatives. Copper is an important metal for <i>irogane</i> . The micro-morphology of coloured layer of copper was observed with a scanning electron microscope. It was confirmed, by X-ray diffraction, infrared absorption and X-ray photoelectron spectroscopy, that the coloured layer of copper consists of Cu ₂ O (cuprite). The distribution of Cu, O and other trace elements in the coloured layer were detected by secondary ion mass spectroscopy.	<i>nikomi-chakushoku</i> , copper, coloured layer, surface analysis, element distribution	煮込着色, 銅, 着色層, 表面分析, 元素分布	
No.31	1986	Yukiharu, SATO; Masao, HASEGAWA	Concerning the Dyestuff Occurring in Dried and Fresh Roots of <i>Mercurialis leiocarpa</i> , II	18-23	A whole plant of <i>Mercurialis leiocarpa</i> including green shoots, leaves and colorless roots which are carefully dried in the cool contains a blue pigment within the tissues. In a previous report, it was mentioned that this pigment seemed to correspond to cyanohermidin; the isolation procedure and chemical nature of this substance are described here. A series of analyses showed that cyanohermidin rather resembles allagochrome which is a copper protein, but it contains no protein. Therefore, cyanohermidin may be regarded as a chromophore of allagochrome. According to Swan, cyanohermidin may well be understood as a complex of anionic radicals of 4-methoxy-1-methylpyridine 2, 3, 6-trione and tautomers of 3, 6-dihydroxy-4-methoxy-1-methyl-2-pyridinone. Likewise, the authors' experiment has also suggested that cyanohermidin contains some copper molecules as a stabilizer of radical anions. When cyanohermidin was used as a dyestuff for silk and cotton in ancient Japan, aqueous extract of dried tissues or cell sap of fresh tissues (for <i>surizoine</i>) were used together with certain copper compounds which were effective in keeping a bluish coloration on silk and cotton cloths.	<i>Mercurialis leiocarpa</i> , blue pigment, cyanohermidin, copper, <i>surizoine</i>	ヤマアイ, 青色色素, チ アノヘルミジン, 銅, 摺 染	
No.31	1986	Yasunori, MATSUDA	Dyeing Behavior and Photofading of Berberine as a Dyestuff	24-31	Berberine, showing some antibacterial effects, can be obtained from kihada (Amur cork-tree), <i>Phellodendron amurense</i> Ruprecht bark. Kihada has been used in Japanese traditional dyeing as a yellow dyestuff. The quantitative description of the behavior of berberine under the dyeing equilibrium is reported in the present paper. The results of experiment suggest that the relations between amounts of berberine, adsorbed on silk, and concentration of berberine in dyebath fit the Freundlich equation. Experiments on fading behavior were also carried out under the following conditions; the silk cloths dyed with berberine were exposed to the sunlight directly for 0.5-64 hours. Color differences, diffuse reflectance spectra and fluorescence spectra of the dyed samples were measured before and after exposure. It was found that fluorescence intensity of berberine on faded samples decrease with increasing exposure time, and the measurement of fluorescence spectra is a useful means for investigation into the photofading of some natural dyestuffs showing fluorescence. In addition, extracts from the most faded sample were examined for light-induced decomposition of berberine using a thin-layer chromatography, a liquid chromatography and an infra-red spectroscopy. Some decomposed components of berberine were detected and characterized.	Phellodendron amurense, Berberine, photofading, dyeing mechanism, textile	キハダ, ベルベリン, 光 退色, 染色機構, 染織 品	

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No.31	1986	Masamitsu, INABA; Ryuitiro, SUGISITA	Effect of Dōsa on the Deterioration of Washi (Japanese paper)	32-40	<i>Dōsa</i> which consists of animal glue and alum, is glue size for <i>washi</i> . In this paper, the effect of <i>dōsa</i> on the deterioration of <i>washi</i> is studied. The results of experiments are: 1) By applying alum, pH of <i>washi</i> is lowered. However, when the sample has higher buffering ability toward acidity, the lowering of its pH is fairly diminished. 2) Deterioration rate of folding endurance and discoloring rate of <i>washi</i> increase with the increase of its acidity. Applying <i>dōsa</i> to <i>washi</i> , when the sample has higher buffering ability toward acidity, a smaller increase of deterioration rate was observed. 3) The presence of animal glue in <i>washi</i> causes little effect on the deterioration rate. 4) By applying animal glue, <i>washi</i> increases its tensile strength.	<i>washi</i> , <i>dōsa</i> , acidity, folding endurance, deterioration	和紙, ドウサ, 酸性度, 耐折強さ, 劣化	
No.31	1986	Tadateru, NISHIURA	Study on the Color Change of Stone by Impregnation with Silane (No.1) - Analysis of the Color Change by Color Meter-	41-50	The color change of stone by impregnation with silane was experimentally studied by using color meter (Table 2, Fig. 6). The following results were obtained by the experiment : 1) The more amount of silane was impregnated, the stone exhibited greater difference of color [dE] (Table 2, Fig. 7, 8 & 12). 2) The difference of color was dependent mainly on the fall in value and negligibly on the difference of chroma and hue (Fig. 9). 3) After the artificially accelerated deterioration treatment, all the stone samples showed almost the same color, which was nearly the same as their original color (Fig. 4, 7, 8 & 9), while the hydrophobic effect of the stone samples was still found adequately (Table 3, Fig. 10 & 11). This study confirms the experientially noticed fact that stone is darkened by impregnation with silane, but regains its original color with time in outdoor conditions while it keeps the treatment effect of silane.	stone monument, silane, impregnation, color change, color meter	石材文化財, シラン, 含浸処理, 変色, 測色計	
No.31	1986	Yoshikuni, YANAGI; Weijun, HU; Kiyoshi, HIRABAYASHI	Reasons for Warp Breaking of Old Silk Fabrics from the Edo Period	51-54	Warp breaking of old silk fabrics was explored. Deterioration was assessed by measuring the breaking strength. The reasons for warp breaking are as follows. 1) In silk fabrics of the <i>Edo</i> period the warp diameter is smaller than the weft diameter. 2) As raw silk is used in the warp of the fabrics, the warp deteriorates rapidly more than the weft made of degummed silk.	silk fabrics, deterioration, warp breaking, moisture, breaking strength	絹織物, 劣化, 経糸切れ, 水分, 強度	
No.31	1986	Nobuya, MINEMURA; Katsuo, UMEHARA	Control of the Photo-induced Discoloration of the Paper with Polyethylene Glycol	55-57	新聞紙を窓際におくと、二三日で黄変する。博物館などで、貴重な記事の掲載新聞を展示しておく場合でも同様の変色が見られる。このような紙の黄変を、薬剤塗布という簡単な手法で止めることを試みたので報告する。 使用した薬剤はポリエチレングリコール(以下 PEGと略記)である。この薬剤は白色系木材の光変色抑制に効果のあることが認められている ¹⁾ 。	paper, photo-induced discoloration, polyethylene glycol, coating, color difference	紙, 光変色, ポリエチレングリコール, 塗布, 色度	
No.31	1986	Kazuo, YAMASAKI	Activities of the Conservation Committee of the Hōryūji Wall Painting during 1945-1953.	58-61	本誌第30号(1985)に昭和14年から昭和20年版職までの壁画保存調査会の活動状況について記した。これに続いて改載から昭和28年金堂上様式までのことを記すことにする。			
No.31	1986	Hideo, ARAI	Preface to Special Theme on Biodeterioration and Its Countermeasures	64				
No.31	1986	Hachiro, MORI	Distribution, Damage, Current and Potential Control Measures of the Formosan Subterranean Termite, <i>Coptotermes formosanus</i> Shiraki, in Japan	65-73				
No.31	1986	Makiko, SUGIYAMA	Effect of Insecticides and Fungicides on Pigment Materials of Art Objects	74-80	Insecticides or fungicides are generally used for the conservation of museum objects. But these products should not in any way affect valuable art objects, especially their colors. In order to determine the influences and effects brought by these products, an experiment was tried to assess the change in pigment materials by ocular observation and by the use of electronic microscope. Sample pieces of various pigments were exposed for 3 months to vapor of 8 kinds of insecticides and fungicides. It was proved that all vegetable dyes and many inorganic pigments were little affected by the exposure. With some pigments, fading changes of colors or glazing of surfaces of objects were observed. And these effects may have been caused by interaction of such dyes and solvents used in paintlayers.	insecticides, fungicides, pigment materials, color change, solvent	防虫剤, 防霉剤, 彩色材料, 変色, 溶剤	

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No.31	1986	Kazuo, KAMIMURA; Hiroshi, Okabe	Biological Investigations of the Environment in a Museum and Countermeasures Against Harmful Organisms	81-91	<p>Gunma Prefecture Museum of History was established in the Prefectural Park "Gunma-no-mori" in 1979. The park covers 116 hectares of forests which are inhabited by many wild birds and small animals. Because of such an environment, prevention of these organisms from entering the Museum facilities is a very important subject of concern from the point of view of the conservation of historical materials. In addition, since some of the materials newly received at the Museum are already infested by insects and fungi, treatment of such materials and prevention of the spreading of damage to other materials have also become necessary.</p> <p>Therefore, in addition to periodical fumigations of facilities and materials themselves, investigations were made into the actual condition of organisms entering Museum facilities so as to better determine the method of preventing insects and fungi from attacking cultural properties.</p> <p>In biological investigations of the Museum in 1984, 471 different insects were collected in a period of 80 days. Among them were found such insects as Dermestid beetles, clothes moths and spider beetles that cause damage to cultural properties.</p> <p>The reason why there were so many Dermestid beetles are that their larvae seek animal materials (leather, wool, silk etc.). From this point of view, it may be said that the great number of the insects is related to the carpet used in the Museum which includes 27.5% wool. Even after the spraying of Smithion-VP (fenitrothion 5%, DDVP 2%) during the investigation, the rate of survival of Dermestid beetles were higher than that of other insects. Fumigation by chemicals like methyl bromide is needed for the total extermination of these insects.</p> <p>Studies on the places of insect-collection revealed the fact that many species of ants and other insects were found in resting areas. It is thought that these insects come in search of pieces of food left-over by visitors. Since Dermestid beetles and spider beetles tend to gather around the dead bodies of insects, they were found in great numbers under emergency lights.</p> <p>Based upon the results of these investigations, openings in the Museum have been equipped with screen doors to shut out insects. In addition, other improvements have been made on the facilities to minimize unwanted small opening and to provide double doors at entrances. Furthermore, to maintain an environment difficult for organisms to inhabit, daily cleaning is carried out thoroughly and visitors are requested not to bring dirt, dust or foods. Above all, in order to improve the understanding of the Museum toward the conservation of materials, training has been given by experts.</p>	<p>museum environment, countermeasures, biological field research, fumigation, insect-collection</p>	<p>博物館環境, 防除対策, 生物調査, くん蒸, 昆虫採集</p>	

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No.31	1986	Kyohei, YAMAMOTO; Norihisa, KURUMAZUKA	Preventive Measures for Lichens and Algae on Stone Objects	92-100	<p>In our country, very few reports have been made so far on the actual measures taken to prevent stone objects from biological deterioration due to lichens and algae. The authors have often been requested to prevent lichens and algal growths during the process of restoring stone objects and making their replicas. Recently, the authors carried out biological and lithological investigations on three types of stone objects and conducted preventive measures against lichens and algae. The following is a report on the authors' research.</p> <p>The first of the three stone objects, "Kurokawa-dosojin", bears an inscription "Kan-ei 3" (1850 A. D.); hence, it is a least 130 years old. It is the Tuffaceous sandstone. Exfoliation and missing parts were observed. Deteriorated parts, were notably weathered. <i>Caloplaca</i> sp. and <i>Endocarpon</i> sp. were found. The inscription, especially, was covered entirely with lichens so that, if left untouched, it may become completely illegible.</p> <p>One of the "Rokujizo" (a set of six stone statues), the second stone object, bears the inscription "Ho-ei 8" (1711 A. D.), so at least 270 years have passed. It is Pyroxene-andesite and its state of preservation was fairly good so that only some missing parts were observed. Biological growth included the lichen <i>Lepraria</i> sp. and some green algae. <i>Lepraria</i> sp. made the reading of one of the characters, 八 (8), very difficult.</p> <p>The third stone object, "Sekiba", is of the Kofun period (5-6 th cent.). It is Hornblende andesite. There were significant unevenness and scalings. The long years of weathering had made it difficult to distinguish the detailed parts of the decorative designs. The green algae <i>Chlorella</i> were found breeding notably at three places.</p> <p>The following preventive measures were taken for the first example; formalin method was used by which parts attacked by lichens were covered for 24 hours with cotton soaked in formalin. For the second and third examples, AC-322, chemicals used as preventive measure in the restoration of Borobudur, was applied over lichens and green algae for 24 hours; this was then followed by brushing off all lichens and algal growths.</p> <p>As a result, although only sterilization was carried out on the "Kurokawadosojin" object for fear of further exfoliation and loss of the sandstone surface, the orange color of the <i>Caloplaca</i> sp. on the inscription became discolored and the inscription became more legible. <i>Lepraria</i> sp. and green algae on one of the "Rokujizo" were removed completely and all the inscriptions were deciphered.</p> <p>All the <i>Chlorella</i> on "Sekiba" were removed but, since dust gathered in the indented parts of the stone surface was also removed, there was a great tendency for the difference between the treated and non-treated parts to become more noticeable.</p>	stone monuments, lichens, algal, restoration, elimination	石造文化財, 地衣類, 藻類, 修復, 除去	

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No.32	1987	Tadateru, NISHIURA; LI, Zuixiong	Experimental Study on the Consolidation of Stone with Potassium Silicate	1-12	<p>Treatment of very fragile and porous stone in a highly dry condition with potassium silicate was experimentally studied as to its consolidating effect and durability (stability) for the conservation of grottoes in China.</p> <p>Following results were obtained by the experiment:</p> <ul style="list-style-type: none"> Impregnation with potassium silicate increased the splitting tensile strength of the treated stone 1.5 to 2 times. This consolidation effect was almost the same as the effect gained with acrylic resin and silane, and its durability was as high as that gained with silane. Potassium silicate whose molar ratio of SiO₂ to K₂O is about 4.0 showed quite high water resistance, while one whose molar ratio is up to 3.0 showed very low resistance. Efflorescence (crystallization of potassium carbonate) on the treated stone was extremely dependent upon the molar ratio of SiO₂ to K₂O of the potassium silicate applied. The degree of efflorescence of the stone treated with potassium silicate whose molar ratio is about 4.0 was by far lower than the one whose molar ratio is up to 3.0. <p>From the above results it is considered that potassium silicate whose molar ratio of SiO₂ to K₂O is high (3.8~4.0) is quite a possible consolidant of very porous and fragile stone of grottoes in the north-west region of China which is in a very dry climate.</p>	stone, consolidation, potassium silicate, Chinese Grotto, efflorescence	石材, 強化保存処置, 硅酸カリウム, 中国石窟, 白華現象	
No.32	1987	Shuye, DUANG; Jun-ichi, MIYATA; Noriko, KUMAGAI; Ryuitiro, SUGISITA	Analysis of Pigments & Plasters from the Wall Paintings of Buddhist Temples in North Western China	13-20	<p>Pigments and plasters from wall paintings of Buddhist temples in Northwest China were analyzed by an electron probe X-ray microanalyzer (EPMA) and an X-ray diffractometer. The structure of each paint layer was examined by surface and cross-section samples of paint fragments taken from the walls with an optical microscope. From the results of elemental analysis by EPMA, it is possible to say that the pigments might be vermillion, azurite, atacamite, red and yellow of iron oxides, lead white, white of Ca and Mg, and black of copper sulfide. Calcite, dolomite, albite and α-quartz were detected only in the plasters by an X-ray diffractometer.</p>	wall painting, Dunhuang, Tsinghai, analysis, pigment	壁画, 敦煌, 青海省, 分析, 顔料	
No.32	1987	Jun-ichi, MIYATA	Analysis of the Crystalline-like Substances Observed on the Surfaces of Oil Paintings	21-30	<p>Crystalline-like substances observed on the surfaces of oil paintings were analyzed by an electron probe X-ray microanalyzer (EPMA) and an X-ray microdiffractometer. These substances were different from the common compounds of dust observed on the surfaces of oil paintings. The samples were taken from two oil paintings: one is R. Koiso's "Rafu" (Nude), another is N. Koide's "Tsubaki" (Camellia). By an optical light microscope, these samples were observed as transparent granules and they did not appear to dissolve in water or dilute acids.</p> <p>Results of the samples from "Rafu": Zn, Mg, K, Pb and S were detected by EPMA, PbSO₄, and (NH₄)₂Zn(SO₄)₂ · 6 H₂O were identified by an X-ray microdiffractometer. These results indicate the samples to be some sulfate compounds of Zn, Mg and Pb.</p> <p>Results of the samples from "Tsubaki": Zn, Mg, and S were detected by EPMA. The diffraction pattern was observed by an X-ray microdiffractometer, but no corresponding compound was found. These results indicate the samples to be some sulfate compounds of Zn and Mg.</p> <p>Cross-sections of paint fragments and grounds of the two works were analyzed by EPMA. The results of this analysis showed that these paint fragments and grounds contained no crystalline-like substance.</p>	crystalline-like substance, qualitative analysis, oil paintings, EPMA, X-ray microdiffractometer	結晶分析, 定性分析, 油彩画, EPMA, 微細部X線回折	
No.32	1987	Ryu, MURAKAMI; Sakae, NIYAMA; Masahiro, KITADA	Characterization of Coloured Layer of Shakudo (1)	31-39	<p><i>Shakudo</i> is a copper alloy basically containing 1~5 wt% gold. <i>Shakudo</i> is famous for its black surface; but, this black surface does not appear before the alloy is treated by <i>nikomi-chakushoku</i>, which is a traditional Japanese colouring method. The <i>shakudo</i> specimens were experimentally prepared and examined. X-ray diffraction method revealed that the coloured layer of the experimental <i>shakudo</i> consisted mainly of cuprite. <i>Shakudo</i> used for actual artifacts was investigated by X-ray non-destructive diffraction analysis. It was also confirmed that the coloured layer of the historical <i>shakudo</i> consisted mainly of cuprite.</p>	characterization, <i>shakudo</i> , black surface, coloured layer, cuprite, X-ray diffraction analysis	キャラクターゼーション, 赤銅, 黒色表面, 着色層, 亜酸化銅, X線回折	

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No.32	1987	Sadatoshi, MIURA; Masashi, FUJII	Investigation of a Gilt Bronze Statue by High Energy X-ray Scanner	40-46	A small gilt bronze statue was investigated by an industrial X-ray CT scanner, "TOSCANER-4200" of Toshiba Corporation, which uses high energy X-rays of 420 kV maximum. The statue, which is about 30cm high and 3.8 cm thick at the head, is supposed to have been made sometime between the end of the seventh century and the beginning of the eighth century. The bronze contained more than 90% copper and a little amount of iron, tin and arsenic. The head of the statue was scanned twice by X-rays of 350 kV. Computed tomograms were reconstructed as a matrix of 320 X 320 pixels. The computed tomograms revealed an inlaid metal and a scraped hollow. The hollow is likely to be filled with soil. A method of casting was discussed, based on the results of the X-ray CT scanning and the gamma radiography. It is supposed that the statue was cast twice. The first casting might have failed causing the hollow and the missing part of the head. The hollow was scraped before the following casting in order that the newly cast part might be tightly joined to the body. The hole on the face was modified by inlaying a piece of metal. A detailed discussion about how the statue was cast could not be done without the high energy X-ray scanner "TOSCANER-4200".	Xray CT, Gilt bronze statue, Gamma ray radiography, Casting	X線 CT, 金銅仏, γ線透過撮影, 鑄造	
No.32	1987	Tadaki, MIYOSHI; Yasunori, MATSUDA	Laser-Induced Fluorescence and Reflection Spectra of Red and Purple Natural Dyes on Silk Cloths	47-53	Fluorescence spectra due to nitrogen laser excitation were measured for silk cloths colored with some red and purple natural dyes. Identification of these dyes on silk was made possible by the use of laser-induced fluorescence method, since the respective dyes are characterized by their fluorescence spectra. Moreover, it became possible to identify each dye even on faded cloths in this experiment. Results gained by reflection spectra were compared with those obtained by laser-induced fluorescence method.	natural dye, textile, fluorescence, reflection, photofading	天然染料, 染織品, 蛍光, 反射, 光退色	
No.32	1987	Katsuhiko, MASUDA	Preface to Special Theme on Conservation of Paper Objects	56-57				
No.32	1987	Masamitsu, INABA; Ryuitiro, SUGISITA	Changes of Tensile Energy Absorption (TEA) and Carbohydrate Composition of Washi (Japanese Paper) by Ageing Treatment	58-63	Deterioration of <i>dōsa-sized washi</i> was studied. ¹⁾ Deterioration rates of tensile strength (breaking length) and tensile energy absorption (TEA) were calculated to compare them with that of folding endurance. Since these three values are well correlated, the former values can be used as indices of permanence of <i>washi</i> , but the deterioration rate of tensile energy absorption is a superior index than that of tensile strength. This is zbee a use TEA is more practical in measuring and there is smaller scattering of data. Carbohydrate compositions of <i>washi</i> were measured by alditol acetate method. The amount of carbohydrate in the <i>washi</i> , however, showed little change after ageing treatment. 1) For previous study on this subject, see "Scientific Papers on Japanese Antiques and Art Crafts," No. 31, pp. 32-40 (1981).	<i>wadhi</i> , <i>dōsa</i> , deterioration, TEA, Carbohydrate Composition	和紙, ドウサ, 劣化, 引張りエネルギー吸収, 糖組成	
No.32	1987	Raysabro, OYE; Keiichi, OMORI; Takayuki, OKAYAMA; Eiichi, USHIYAMA	Treatment of Paper for Controlling Degradation by Neutralizer	64-69	Several neutralizers were tested to assess their effect on conservation of paper from degradation. The following results were obtained. (1) Alkoxy magnesium-alkylcarbonates such as methoxy magnesium-methyl-carbonate ameliorates pH of acid papers were very effective in controlling degradation by ageing. (2) It was observed that diethyl-zinc did not increase the pH of papers as high as did alkoxy magnesium-alkylcarbonates; however, diethyl-zinc was quite effective in lowering the degradation rate even with as much as 0.5% of zinc remaining in the paper.	degradation, neutralizer, diethyl-zinc, acid paper, ageing	劣化, 中和剤, ジエチル亜鉛, 酸性紙, 経年変化	

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No.32	1987	Akinori, OKAWA; Takeo, KADOKURA; Katsuhiko, MASUDA	The Effect of Calcium Carbonate on the Degradation of Paper	70-77	<p>The authors have obtained data from which they could presume that white pigment (calcium carbonate) used in wood block print decreases the degradation of paper printed as well as of the lining paper.</p> <p>Two wood block prints printed 90 years ago were used as samples.</p> <p>First, the white pigment used in the prints was identified by non-destructive X-ray diffraction analysis as calcium carbonate mixed with plaster of Paris, but alum was not found. The existence of plaster of Paris and none of alum was considered to be the result of reaction between calcium carbonate and alum. Calcium carbonate was also found in the white part of the lining paper which corresponded to the white color of the print.</p> <p>Second, tensile strength, folding endurance, elongation and pH value were measured at the brown parts and white parts of the lining paper. The white parts showed higher value than brown parts in all measurements. The pH value in the white parts was about 6, that is one point higher than that of the brown parts. It is reported that the paper showing pH 5 discolors and degrades faster than the paper showing pH of more than 5. The brown color of the lining paper was thought to be a result of discoloration caused by alum which caused the brown parts to have low pH value.</p>	wood block print, calcium carbonate, degradation, pH value, mechanical strength	木版画, 炭酸カルシウム, 劣化, pH 値, 強度	
No.32	1987	Sadatoshi, MIURA; Katsuhiko, MASUDA	The Influence of Potassium Aluminum Sulfate on the Degradation of Japanese Hand-made Paper	78-85	<p>Damage on paper varies according to the concentration of potassium aluminum sulfate (PAS) in the sizing solution (" <i>dōsa</i> ") for Japanese paintings. The sizing is a mixture of animal glue and PAS, and prepared by the artist himself. The usual concentration of PAS in <i>dōsa</i> is about 0.5%. Some artists use higher concentration of PAS and/or apply <i>dōsa</i> repeatedly to the paper. It is often observed in paintings sized with <i>dōsa</i> that some are still in good condition showing the white ground of the paper, though others are discolored into dark brown. In this report it was experimentally confirmed that the damage of paper depended upon the concentration of PAS added to the sizing.</p> <p>Japanese hand-made paper was used for samples. In the first experiment, nine kinds of sizing solution were prepared: various mixtures of PAS (0.5% and 5%) or aluminum sulfate (AS) (0.5% and 5%) and 1% animal glue in water. The samples applied with the sizing solution were artificially aged in a condition of 80°C and 80% RH for two or four weeks. Folding endurance was measured after ageing. The result showed little difference between the control and the sample treated by 0.5% PAS and 0.5% AS, but considerable difference between the control and the sample treated by 5% PAS, and especially by 5% AS. The existence of 1% animal glue gave little difference to the result.</p> <p>The second experiment was done in order to know at what concentration the folding endurance greatly decreased. Nine different concentrations of PAS solution were prepared from 0.5 to 4.5% with a step of 0.5%. The condition of the artificial ageing was the same. Folding endurance, pH value and, whienes were measured before and after ageing. After two weeks' ageing the folding endurance of the sample treated with a solution higher than 3.5%, i.e. less than pH 5, decreased in half.</p> <p>From the results of the two experiments it was considered that paper treated by <i>dōsa</i> became quickly damaged when the pH of the paper was lower than 5. This pH value corresponds with one which is reported on the degradation of pulp by other researchers.</p>	<i>wadhi</i> , <i>dōsa</i> , acidity, alum, degradation	和紙, ドウサ, 酸性度, 明礬, 劣化	

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No.32	1987	Raysabro, OYE; Keiichi, OMORI; Mana, OYAMA	Research on the Degradation of Documents	86-94	<p>One hundred and thirty samples from Kanagawa Prefectural Archives were examined for pH value, brightness and moisture content. The results were discussed on the relation between the kind of sample paper and each examined value.</p> <p>Woody papers especially made just after World War II were acidic having pH 4 on an average, and were considered to be in the advanced stage of degradation from the point of brightness. It was supposed that this kind of paper was sensitive to storage conditions.</p> <p>Draft archives of wood-free paper showed low pH value of around 4.5 on an average. They were typical acidic papers. A considerable amount of archives were of traditional Japanese paper. They showed pH value of 4.9 on an average and had enough strength even after degradation, because of its high initial strength. However, it is to be noted that these paper were still acidic.</p> <p>The reprography and drawing paper of <i>diazo</i> type had already degraded severely. Treatment for such copying paper should be developed separately from that of other acidic paper.</p> <p>Most of the archives paper were acidic and their degradation progressing. A prompt action for de-acidification of the archives paper is required.</p>	archives, pH, woody paper, Japanese paper, degradation	古文書, ペーパー, 木材パルプ紙, 和紙, 劣化	
No.32	1987	Raysabro, OYE; Mana, OYAMA; Keiichi, OMORI; Tadayuki, OKAYAMA; Akio, YASUE	Study on Library Materials	95-99	<p>Forty-nine samples of papers from books published between 1912 and 1957 were examined for fiber composition, brightness, folding endurance, ash content, ash composition, water content and pH value.</p> <p>The results showed that degradation does not always depend on how old the paper is but much upon the social situations of the time when it was made. Hence, the paper made during and just after World War II showed the highest degradation. The reason is that the quality of pulp fiber during war-time was very low.</p>	degradation, fiber composition, pH, folding endurance, filler	劣化, 繊維組成, ペーパー, 耐折強さ, 填料	
No.32	1987	Margaret, HEY; (translated by Katsuhiko, MASUDA)	Paper Bleaching—Its Simple Chemistry and Working Procedures	100-105	<p>The author explains in the article the characteristics, advantages and disadvantages of those bleaching compounds presently available which is required in paper restoration, though this is not intended to advocate bleaching during restoration.</p> <p>This is translated from the article which was contained in the second volume of "the Paper Conservator" from pp. 10 to 23 published in 1977 by the Institute of Paper Conservation, under kind permission received from the author.</p>	paper, bleaching, bleaching agent, bleaching procedure	紙, 漂白, 漂白剤, 漂白工程	
No.33	1988	Masako, SAITO; Fumiko, MORIOKA; Maresuke, KASIWAGI	Analysis of Kinran and Ginran of Edo Period	1-9	<p>Kinran and Ginran have been known as two of the most gorgeous textile products interwoven with gold or silver threads. Seventeen pieces of these fabrics from the 17-19 centuries were investigated in detail for fabric structure, dyes and fiber constituents by means of appropriate scientific techniques.</p> <p>Amino acid composition in silk fiber was determined by the use of HPLC amino acid analyzing system. For the identification of each dye, absorption spectra of dye extracts in parallel with the known specimens of corresponding plant dyes, various chemical tests and the technique of TLC were successfully applied, along with reflection spectra of dyed cloths. Metallic ingredients in both gold and silver threads were also examined by X-ray fluorescence analysis.</p>	Kinran, Ginran, amino acid composition of silk, fabric structure, natural dye	金襴, 銀襴, 絹のアミノ酸組成, 織物構造, 天然染料	

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No.33	1988	Sumiko, URABE; Mifumi, YANAGISAWA	Effect of Several Mordants on the Deterioration of Dyed Silk Fabrics	10-17	<p>This report describes the effects of metallic elements in various mordants upon physical damages caused by exposing dyed fabrics to ultraviolet light as well as to oxygen. The fabric used was silk, which was dyed with three different types of vegetable dyes in combination with three different mordants. Analytical experiments were made by accelerating the aging process of fabrics, and the following results were obtained :</p> <p>1. As for Fe which is contained in the Fe-mordant as a coordination bond metal, its concentration of excitation remained unchanged even after 160 days of O₂ exposure (at 34% R.H., 99. 7% O₂), and also after 10 hours of exposure to ultraviolet light (at 40±1 °C, 58% R.H.). However, in the case of Al-mordant and Cu-mordant, the coordination bond energy of metallic elements greatly decreased in their concentration as a result of the same treatment.</p> <p>2. As regards the changes in tenacity and elongation, both measurements decreased in direct proportion to the period. tested as for the Fe-mordant, whereas for other mordants, tenacity and elongation once decreased and then seemed to recover gradually. There was a tendency for the fabric to harden.</p> <p>3. Even though tenacity and elongation decreased, the color and hue of the fabrics did not change to a great extent.</p>	dyed silk fabrics, mordant), deterioration, atomic absorption analysis, tenacity and elongation	染織絹繊維, 媒染剤, 劣化, 原子吸光分析, 強伸度	
No.33	1988	Kiyoshi, TOYOSHIMA	Study of Tegurome-urushi (Handiworked Kurome-urushi) for Restoration	18-23	<p>For the restoration of old urushi, it is suitable to apply the same handiworked kurome-urushi as that which old craftsmen used. To obtain teguromeurushi from raw urushi is to stir urushi with a spatula in a vessel open to air. Samples of 10-100 grams of urushi were weighed during the process of making kurome-urushi C water content 6-8% from raw urushi C water content 20-26%. Weight of urushi decreased almost linear to stirring time during periods of both ordinary (20-30°C) and higher (35-40°C) temperatures. The decrease of weight of urushi was caused by loss of water in urushi. Consequently oxygen in air did not affect the weight of urushi under work even though it played a role in darkening the color and increasing the viscosity of urushi. At the final stage to kurome-urushi, appropriate quantity of water was added and stirring was continued until satisfactory result was determined by turbidity test. Kurome-urushi obtained with this process had high viscosity and its dried film had very good lustre and clarity.</p>	Working procedure to Urushi, Raw urushi, Kuromeurushi, Water content, Handiworked Kurome-urushi	製漆法, 生漆, 黒目漆, 含水量, 手ぐろめ漆	
No.33	1988	Ryu, MURAKAMI; Sakae, NIYAMA; Masahiro, KITADA	The Characterization of Black Surface of Shakudo (Ⅱ)	24-32	<p>Shakudo is one of the traditional Japanese alloys which is coloured by nikomi-chakushoku, a traditional Japanese colouring method. Shakudo is a copper alloy containing basically 1~5 wt% gold. It is famous for its black surface, but this colour does not appear before the alloy is treated by nikomichakushoku. The authors previously reported that the coloured layer of shakudo consisted mainly of cuprite (Cu₂O). In this paper, the micromorphology of the coloured layer was observed with a scanning electron microscope (SEM). The coloured layer was found to be an aggregate of fine particles of cuprite; it was flexible and adherent. The distribution of copper, oxygen and gold in the coloured layer was detected with Auger electron spectroscopy (AES). These results were compared and discussed with the data of the coloured layer of pure copper. Analysis with a transmission electron microscope (TEM) suggested that fine gold particles in the coloured layer of shakudo influenced the purplish black colour of shakudo.</p>	shakudo, black surface, nikomi-chakushoku, Auger electron spectroscopy, fine gold particle	赤銅, 黒色表面, 煮込着色法, オージェ電子分光, 金微粒子	

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No.33	1988	John, WINTER; Emile, JOEL	'Lead White' in Japanese Paintings (II)	33-44	<p>著者の一人の以前の研究¹⁾と最近の発表された成瀬・木村の研究によると、初期の日本画や彩色品にみられる鉛白は、一般に考えられている塩基性炭酸鉛ではなく、しばしば塩基性塩化鉛である。塩基性塩化鉛はつきの形であらわれる。ヒドロオキシン塩化鉛(ラウロオナイト)とオキシン塩化鉛(以前には componentB とされ、 blixiteに関するものである)。この論文の表1には、以前述べたパターンに従う新たな同定例を5つ挙げる。塩化物が見つかる原因は作品自体に化学的变化が起こったか、絵師が色々な顔料を使用したかの可能性が考えられる。筆者らが作品の化学変化説を否定するのは下記のような理由による。</p> <ul style="list-style-type: none"> ・そのような反応がなぜ中国や朝鮮半島の絵画にみられず、日本の絵画にのみ起きるのか説明するのは困難である。 ・塩基性塩化鉛は今では絹や紙に構かれた絵や、木に描かれた彩色装飾にも見つかっており、それら作品の制作時期は広い範囲にわたっていて、様々な状況において保存されている。 ・そのような反応が起こるのなら、塩化物と炭酸塩の混合物がしばしば見つかるてもよいはずである。混合物は確かにみられるが、ごくわずかである。 ・塩基性塩化鉛が含まれる作品の多くは、マラカイト(孔雀石)やアズライ、(藍銅鉱)をも含んでいる。なぜ塩基性炭酸鉛が塩基性塩化鉛に転化するのと同じ作品の塩基性炭酸銅は転化しないのかを説明するのは難しい。 ・そのような化学変化を引き起こす反応物質は明確ではない。 <p>従って日本の絵師は少なくとも8th15世紀の頃から塩基性塩化鉛を白色顔料として使用していたようである。8世紀の顔料表には鉛白の国産品と輸入品をはっきりと区別しているため、塩基性塩化鉛が国産品で塩基性炭酸鉛が輸入品であったらという仮説が成り立つ。従って、これら顔料がどこからきたのかを知るために、鉛を含む白色顔料の鉛同位体比を調べた。表2は日本の絵画から得られた塩基性塩化鉛の結果で、表3は日本の絵画にみられる塩基性炭酸鉛の結果である。表4は中国の絵画の塩基性炭酸鉛をまとめたもので、表5は朝鮮半島の絵画における塩基性炭酸鉛の結果である。図1と2はすべてのサンプルの鉛同位体比をグラフに表わしたものである。</p> <p>得られた結果を日本の鉛鉱石に関する同位体比の文献値と比較してみたが、表6にその統計パラメータを示す。また、この表には中国と朝鮮半島のものから得た総合結果(総合大陸グループ)のパラメータも示す。表7は統計的有意度の検定の結果をまとめたものであり、以下の結論を出すことが可能である。</p> <ul style="list-style-type: none"> ・日本の絵画における塩基性塩化鉛は、3つの同位体比すべてに関して日本の鉛鉱石と密接な関係にある。しかし顔料の結果の方が鉱石の結果に比べて分散が少なく、鉱石の領域内でより狭いグループをなしている。これは昔は使用されていた鉛鉱山の数が少なかったからかもしれない。しかしまた、塩基性塩化物が金属からではなく直接鉱石からつくられたという可能性をも指している。というのは金属からだとほかからの鉛金属が混入していることも考えられるからである。 ・研究対象となった日本の絵画の塩基性炭酸鉛が輸入されたものであったという説を裏付ける理由は何もない。これらサンプルにみられる鉛の多くは同位体比により日本産のものと思われ、大陸からの顔料の同位体比とは著しく異なる。しかしサンプルはすべて13th14世紀の絵からのものであり、8世紀の顔料のリストのものはこれらの結果とは無関係である。 ・中国と朝鮮半島の顔料は、検定で統計的には区別できないので、これらを大陸グループと総称してしまってもよいであろう。 ・日本の塩基性塩化物と日本の塩基性炭酸塩の同位体比の統計的平均には著しい差はなかったが後者の方が分散が著しく大きかった。これにより塩化物が絵画における化学的变化によるものだという説を否定する理由がさらにふえる。というのは、もしそのような説が正しいならば平均や分散の差は考えられないからである。 	lead white, lead-isotope ratio, Japanese paintings, basic lead chloride, basic lead carbonate	鉛白, 銅同位体比, 日本絵画, 塩基性塩化鉛, 塩基性炭酸鉛	

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No.33	1988	Jun-ichi, MIYATA	Analysis of the Crystalline-like Substances Observed on the Surface of Oil Paintings (Ⅱ)	45-51	Crystalline-like substances observed on the surfaces of oil paintings were analyzed by an electron probe X-ray microanalyzer (EPMA) and an X-ray microdiffractometer (MDG). The samples this time were taken from Hazama's oil painting "Shakuyaku" (Peony). By an EPMA, three combinations of elements were observed: type 1 was Zn and S, type 2 was Zn, K and S, and type 3 was Zn, K, Mg and S. By an MDG, ZnSO ₄ ·6H ₂ O was identified for type 1 and (NH ₄) ₂ Zn(SO ₄) ₂ ·6H ₂ O was identified for type 3. Three other different diffraction patterns were observed for types 2 and 3, but no corresponding compounds were found. These results indicate the samples to be some complex compounds of Zn, K and S for type 2 and Zn, K, Mg and S for type 3. Crosssections of paint fragments and grounds of the work were analyzed by an EPMA and an MDG. The results of these analyses showed that there were no crystalline-like substances in the painting layers and grounds, but S was detected from the surface of grounds. These results indicate the possibility that the work was affected by SO ₂ gas. It was considered that the crystallinelike substances were the results of blooming.	crystalline-like substance, qualitative analysis, oil paintings, EPMA, X-ray microdiffractometer	結晶様物質, 定性分析, 油彩画, EPMA, 微小部X線回折	
No.33	1988	Setuo, IMAZU	The Method Using Mannitol and Polyethylene Glycol in Freeze Drying Waterlogged Organic Material	52-62	Presently, various methods for the conservation of material from waterlogged sites are utilized, one of them being the Polyethylene Glycol (PEG) treatment. However, these methods have many defects such as the fact that the treatments take much time, the process using organic solvent is very complicated and so on. So the author investigated freeze drying using Mannitol and PEG, for the purpose of the development of a safe and simple method for conservation. The result of the present study is as follows. 1. Waterlogged organic material should be treated in the chamber temperature, while checking the solution density necessary for the stability of the dimension of objects. 2. A new method using PEG (#4000) after Mannitol-treatment has been developed for offsetting the fault of the treatment. 3. The effect for resisting the constriction of the organic material texture by PEG and crystallization of Mannitol has been clarified through observation by scanning electron microscope. The method using Mannitol and PEG in freeze drying waterlogged organic material is much more useful than those of the previous methods. The former method maintains stability of dimension, requires short time' and is simple.	Waterlogged organic material, Mannitol, PEG, crystallization, freeze drying	出土木材, マンニトール, ポリエチレングリコール, 結晶化, 真空凍結乾燥	
No.33	1988	Sadatoshi, MIURA	Discrimination of Azurite and Malachite by Means of Near Infrared Image Processing	63-67	Pigments for a Japanese painting (malachite and azurite) were discriminated by means of an image processing technique. The two pigments, used often closely in a traditional painting and difficult to distinguish each other when darkened by incense, have different spectral profiles in a near infrared area. Azurite has rather high reflectance at a spectral region between 0.8 and 1.5 micrometers, while malachite has low reflectance in that area and high reflectance from 1.5 to 2.0 micrometers. Two infrared reflectograms for both spectral regions were obtained by using different filters: one transmits infrared rays between 0.8 and 1.5 micrometers and another between 1.5 and 2.0 micrometers. The two images were transferred to a personal computer (NEC 9801) and the ratios of reflectance ([0.8-1.5 micrometers]/[1.5-2.0 micrometers]) were calculated against all pixels (150 X 150) of the two reflectograms. Then an image was reconstructed by estimating the value of ratio of each pixel. The reconstructed image was compared with the original one and the result was satisfying. It is supposed that noises were mainly due to insufficient transmittance of the filters.	image processing, reflectography, malachite, azurite, near infrared spectrum	画像処理, 赤外線テレビカメラ撮影, 緑青, 群青, 近赤外線スペクトル	

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No.33	1988	Margaret, HEY	Paper Bleaching – Its Simple Chemistry and Working Procedures (Ⅱ)	68–78	The author explains in the article the characteristics, advantages and disadvantages of those bleaching compounds presently available which is required in paper restoration, though this is not intended to advocate bleaching during restoration. This is translated from the article which was contained in the second volume of the Paper Conservator from pp. 10 to 23 published in 1977 by the Institute of Paper Conservation, under kind permission received from the author.	paper, bleaching, bleaching agent, bleaching procedure	紙, 漂白, 漂白剤, 漂白工程	
No.33	1988	Duan, WENJIE	The History of the Activities for the Conservation of Dunhuang Caves	79–84	The author explains the history of the activities for the conservation of Dunhuang Caves as well as the present circumstances and problems of their conservation. He insists that great efforts have been made for their conservation, and now international cooperation is important especially in the scientific field for that purpose.	China, Dunhuang Caves, conservation, wall painting, pigment	中国, 敦煌石窟, 保存, 壁画, 顔料	
No.34	1989	Yasunori, MATSUDA; Tadaki, MIYOSHI	Non-destructive Analysis of Japanese Ancient Fabrics	1–10	Several fragments of Japanese ancient fabrics, most of which have been attributed to the Shoso-in Repository Fragments (8th century), were examined non-destructively in order to confirm some latent properties of these fragments. Analysis of fibrous material was carried out using the FT-IR-ATR method. Although these fragments have already seriously deteriorated, their IR spectra coincide closely with those of modern silk fibres. Dyeing mordants applied to these fragments were analysed by means of energy dispersive X-ray fluorescence (EDXRF). Several elements, S, Si, K, Ca, Al, P, Fe, Mn and so on, have been detected from the fragments, some of which are particularly rich in aluminum content. Compared with the EDXRF data for the mordanted reference samples, the fragments examined were shown to be mordanted with certain plant-ash. Also, it was surmised that the use of Fe mordant was probably avoided in preparing these fragments, suggesting that ancient Japanese dyers had already been aware of some kind of plant-ash which brings about a dull colour tone on dyeing. In an attempt to identify dyes applied to these fragments, laser-induced fluorescence and optical reflection spectra were measured for both samples, i.e. the fragments and reference fabrics dyed with natural dyes using a traditional technique. Identification was performed by a comparison of various spectral characteristics for both the fragments and reference samples. Shikon and/or Japanese madder have been identified for purple and/or reddish-purple coloured fragments. Combination dyeing of kihada (or wo-ren) and indigotin has been determined for the fragment of yellowish-green colours. The possibilities and limits of these non-destructive methods available for the analysis of ancient fabrics are also discussed. It is proposed that a combination of several non-destructive methods is needed to be applied in cases where some valuable dyed samples are concerned.	textile property, nondestructive analysis, fibre, dyeing mordant, natural dye	染織文化財, 非破壊分析, 繊維, 媒染剤, 天然染料	
No.34	1989	Sumiko, URABE; Mifumi, YANAGISAWA	Effects of Several Mordants upon Deterioration of Dyed Silk Fabrics (Ⅱ)	11–19	Silk fabrics were dyed with three kinds of vegetable dyes, each in combination with a suitable mordant, and the materials were subjected to deterioration by UV-irradiation in an atmosphere of oxygen at a high relative humidity of 79%. The resultant changes in strength, elongation, and discoloration were compared with those of fabrics which were treated at a lower humidity of 30 to 50%. The results were as follows : 1. After the sample made by Fe mordant was irradiated by UV-light at a humidity of 79%, much decrease was observed in strength and elongation of the silk fibers. However, the sample with Al mordant showed fewer changes. 2. After UV-illumination in O ₂ -atmosphere at a higher humidity (79%), the amount of metal that may have leaked out was almost the same as that of the samples treated at a lower humidity of 30 to 50%. 3. After UV-irradiation at a humidity of 79%, most of the samples showed a sign of fading. Among others, shikon showed more rapid discoloration and fading.	dyed silk fabrics, mordant, deterioration, atomic absorption analysis, tenacity and elongation	染織絹繊維, 媒染剤, 劣化, 原子吸光分析, 強伸度	

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No.34	1989	Masamitsu, INABA; Ryuitiro, SUGISITA	Changes in the Degree of Polymerization and Crystallinity of Washi (Japanese Paper) by Ageing Treatment	20-24	Deterioration of dosa-sized washi was studied in degree of polymerization (DP), crystallinity and oxidation. DP was calculated from the results of the viscosity measurement of nitrocelluloses derived from washi samples. The extent of the decrease of DP of cellulose in the washi samples was in accordance with their acidity. The DP of cellulose in washi fibre, which is higher than that in wood fibre may contribute to the permanency of washi. It is reported that partial recrystallization of the amorphous region in fibre during ageing decreases the flexibility of paper. By the measurements of X-ray diffraction, kozo, mitsumata and gampi papers showed resistance to recrystallization during the ageing treatment. It may also be surmised that this fact shows the long life resistance of washi to strength. From the measurement of infrared(IR) spectra of washi sample, the extent of oxidation reaction seemed to be small.	washi, deterioration, degree of polymerization, crystallinity, infrared absorption spectrum	和紙, 劣化, 重合度, 結晶化度, 赤外吸収スペクトル	
No.34	1989	Kiyoshi, TOYOSHIMA	Study of Tegurome-urushi (Handworked Kurome-urushi) for Restoration (II)	25-30	Influence of water content in ordinary kurome-urushi upon time required for drying and the difference between normal raw urushi and active raw urushi were studied. Each raw urushi of about 100 g each was made into ordinary kurome-urushi by continuing to stir them even after turbidity disappearing point (TDP) until they ceased to decrease in weight. During the process, three samples containing 10%, 6 % and 4 % water, and an end-point sample were obtained for each kind of urushi. For two series of samples, drying tests were done in a small urushi drying chamber in which temperature was controlled with a thermostatt and humidity with a saturated inorganic salt solution. Two test-methods were chosen to see the time required for drying. The following results were obtained. Each kind of raw urushi contained about 2% water when the decrease of weight of urushi ceased. For each test sample, time required for drying measured by "white breath" method was about half that of "non-sticky" method. The sample taken just after TDP dried most quickly among the four samples of each series. But under drying condition with higher temperature or higher humidity, and also in urushi obtained from active raw urushi, influence of water content upon time required for drying was little. The time required for drying with the end point sample from normal raw urushi varied very much with humidity. So it may be said that this end point kurome-urushi is useful for urushi coating. Dried film of ordinary kurome-urushi made from active raw urushi had good lustre.			
No.34	1989	Nobuyuki, KAMBA	Relative Humidity Changes in a Packing Case during Transport	31-37	Measurements of relative humidity (RH) and temperature were made on the internal environment of packing cases containing kimono objects during their transport between the National Museum of Japanese History (NMJH) and the North Carolina Museum of Art (NCMA). A compact solidstate memory recorder was used for the measurements, and the recorder was packed in a corrugated paper box with the objects. A number of these boxes were placed inside an outer case, constructed from five-ply plywood, lined with a canvaslined aluminium sheet and fitted with cushions of polyurethane foam. Two kg/m ³ of Nik-kapellet was placed in the case as a humidity buffering material when the case was closed. It was observed that poor thermal insulation of the case resulted in significant fluctuations in temperature and RH inside the case, and a rise in temperature caused a rise in RH. The ratios of the RH changes to temperature changes during the flight were 0.5 on the way to the NCMA and 1.3 on the way back. The set of results indicates that the moisture content of the silk fibers of the kimono objects was kept at a constant level during the outward journey, and decreased by about 2% during the return. The change in the moisture content is attributed to a decrease in the airtightness of the case which caused greater infiltration of the external air.	packing case, transport, relative humidity, isotherm, isobar	梱包ケース, 輸送, 相対湿度, 等湿含水率曲線, 等湿含水率曲線	

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No.34	1989	Jun-ichi, MIYATA	Analysis of the Crystalline-like Substances Observed on the Surface of Oil Paintings (Ⅲ)	38-45	Crystalline-like substances observed on the surfaces of oil paintings were analyzed by an electron probe X-ray microanalyzer (EPMA) and an X-ray microdiffractometer (MDG). The samples this time were taken from five paintings. The samples from three paintings showed nearly the same results as follows: Zn, Mg, and S (type 1) or Zn, Mg, K and S (type 2) were detected by EPMA; by MDG, $MgSO_4 \cdot 7H_2O$ was identified for type 1 samples and $(NH_4)_2Zn(SO_4)_2 \cdot 6H_2O$ was identified for type 2. An unidentified diffraction pattern was observed for both types. The samples from the fourth painting contained no element having atomic number greater than Ne, and the diffraction pattern was observed but not identified. By chemical microscopy, the samples dissolved to xylene. The samples from the fifth painting was identified as lead white. Considering these analytical results and those reported in previous papers, crystalline-like substance may be classified into three groups. The substances of group 1 contain sulfur and ammonium salt, and their appearance seems to be the result of a process of blooming similar to that which Thomson indicates in "The Museum Environment." The substances of group 2 seem to be organic compounds such as solidified natural resin or oil which were contained in the paint layer. The substances of group 3 are the pigments which were taken from the surface paints that had flaked off due to a phenomenon like chalking. There was no damage caused by crystalline-like substances that appeared on the surfaces of oil paintings.	crystalline-like substance, oil paintings, qualitative analysis, electron Probe X-ray microanalysis, X-ray microdiffractation	結晶様物質, 油彩画, 定性分析, X線マイクロ分析, 微小部X線回折	
No.34	1989	Nobuyuki, KAMBA; Tokiyuki SATOH	Calcareous Nannofossils Found in Grounds of Japanese Oil Paintings in the Late 19th Century	46-51	An investigation of materials of Japanese oil paintings in the late nineteenth century has been carried out to identify the physical origin of the materials. In previous examinations with X-ray microanalyzer and X-ray diffractometer, forty-three grounds which seemed to be commercially-prepared priming were subjected to examination. It was found that the grounds were classified into 1) calcium carbonate type, 2) lead white type, and 3) others, according to their elements and structures. In this paper, small fossil-like substances about 10 μ m in diameter observed in most of the calcium carbonate type grounds are examined. Optical microscopic examination has revealed that the fossil-like substances were calcareous nannofossils. From measurements of percentages of species of calcareous nannofossils, it appears that the calcium carbonate was chalk of the Campanian period of the late Cretaceous era. Since geologically there was no chalk in Japan during this period, the result has suggested that chalk used on canvas might have been brought from Western Europe to Japan in the late nineteenth century.	calcareousnannofossil, chalk, ground, oil painting, Meiji period	石灰質ナノプランクトン, 白亜, 下地, 油彩画, 明治時代	
No.34	1989	Kazuo, YAMASAKI	On the Chemical Compositions of Glass Fragments Excavated by Zuicho Tachibana, Otani Expedition Member at Kashgar, 1909-1911	52-56	The glass fragments and beads excavated by Zuicho Tachibana at the ruined sites near Kashgar were studied in order to obtain information on their chemical compositions. Relative density measurements and visual examination indicated that most of the beads were alkali-lime glasses. Two small glass fragments of vessels of unidentified shape were found by X-ray fluorescence analysis to be potash-lime glass. A porous black lump was analyzed by inductively coupled plasma-atomic emission spectrometry, and found to be a slag-like substance. White crystals present in this black lump was revealed by X-ray diffraction to be quartz crystals containing a small amount of cristobalite. Although exact dates and sites of the excavation of these glasses are unknown, this study may give some information to the archaeology of glass in Central Asia.	Central Asia, glass beads, glassfragments, X-ray fluorescence analysis, inductively coupled plasma atomic emission spectrometry	中央アジア, ガラス玉, ガラス破片, 蛍光X線分析法, 誘導結合プラズマ発光分析法	

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No.34	1989	SHAN, Wei	Removal of Scales from Inscription Bones and Shells Unearthed in Zhouyuan	57-64	<p>From July to August, 1977, in excavating a site of building foundation of the early Zhou at Fengchu village in Qishan County (" Cultural Relics" No. 10, 1979: Figures 1, 2, 3), the archaeological team of Shaanxi Zhouyuan County unearthed over 17, 000 pieces of inscription bones and shells from a cellar cave. Of them, there were over 16, 700 pieces of oracle turtle shells (plastron) and more than 300 pieces of oracle bones made of ox scapulae¹⁾. Among all the inscription bones and shells, there were over 100 pieces on which were engraved micro-sized inscriptions smaller than 1 mm in diameter. The texture of the bones and shells had lost their original solidity. They could be easily broken off and kneaded to pieces with fingers, but they had not yet been crisply broken.</p> <p>However, the surfaces of a large number of the bones and shells were covered with layers of scales of different density; hence the micro-engraved inscriptions were covered up. The formation of the scales was clue to the immersion of the bones and shells in underground moisture for more than 3,000 years²⁾. Before setting about the removal of the scales, a spectral semiquantitative analysis was conducted. Data of the analysis are listed in Table 1.</p> <p>From the result of the analysis, it was found that there are various kinds of elements, of which most are iron, aluminum, calcium, magnesium and phosphorus, similar to the scales that form on a kettle or a boiler nowadays. Starting from this point of view, a few experiments were made by using methods similar to those of cleaning the scales on kettles and boilers. After several attempts, the EDTA disodium salt complex method and the organic inhibitor method were chosen.</p>	oracle bones and shells, Western Zhou, scale, EDTA, organic inhibitor, cleaning	甲骨, 西周, 土垢, EDTA, 有機抑制剤, クリーニング	
No.34	1989	FENG, Zongyou	Conservation Treatment of Lacquer Wares and Mats Excavated from the Qin Jing Gong Tomb	65-70	<p>中国陕西省鳳翔県の秦公一号墓(秦の景公576-537B. C.の墓, 春秋時代後期)から出土した漆器, 木器, 筵(竹・草・藁製の3種)などの保存処置を行なった。処置の内容は水分除去と強化であるが, 真空を利用する装置がないので, すべて常圧で行なう方法を考案した。まず, 比較的状態が良く含水量の少ない漆器, 木器は, 蒸発速度を抑制した自然乾燥法で良好な結果を得た。つぎに, 竹, 草, 藁などで編まれた筵は, アルコール・ニーテル法で処理するとよいことがわかった。最も難しい問題を提起したのは完全に水浸しの状態で出土した漆塗りの木製の椀であった。自然乾燥では, 漆がめくれ上がり, 木質部が変形する。アルコール・ニーテル法は漆器には適用できない。そこで, つぎのような順に保存処置を行ない, 良好な結果を得た。</p> <p>①十分に水洗する。②濾紙に逆さに置き, 水を切る。③乳香のアセトン溶液を注射針で木質部に注入する。④漆喰で外型と内型を造り, 電気乾燥器に入れて乾かす。⑤遺物を2個の型で包み込み, 欠失部を大鋸屑で充填して, そこに乳香アセトン溶液を流し込む。⑥型で包んだ遺物を木箱に入れ, 箱に砂をいれて本体全部を覆うようにする。⑦そのまま室温で放置し, アセトンと水を徐々に蒸発させる。⑧3日後に取り出し, アセトン溶液を注入し, 再び砂箱に入れて乾燥させる。この操作は, 遺物がもはや1滴のアセトンも吸収しなくなるまで繰返す。⑨最後に15~20日間隔で砂箱から取り出し, 重量を測定する。重量が一定になったら操作を終りとする。</p>	lacquer ware, Qing Gong Tomb No. 1, mat, conservation, frankincense-glue	漆器, 秦公一号墓, 筵, 保存, 乳香	
No.34	1989	Margaret, HEY; (translated by Katsuhiko, MASUDA)	Paper Bleaching-Its Simple Chemistry and Working Procedures (III)	71-82	<p>The author explains in the article the characteristics, advantages and disadvantages of those bleaching compounds presently available which is required in paper restoration, though this is not intended to advocate bleaching during restoration.</p> <p>This is translated from the article which was contained in the second volume of the Paper Conservator from pp. 10 to 23 published in 1977 by the Institute of Paper Conservation, under kind permission received from the author.</p>	paper, bleaching, bleaching agent, bleaching procedure	紙, 漂白, 漂白剤, 漂白工程	

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No.35	1990	Tetuo, SINKAI; Ryuitiro, SUGISITA	Identification of Protein Containing Binding Media and Adhesives in Works of Art by Amino Acid Analysis	1-12	Glue, casein, egg yolk and wheat flour paste used as binding media in art objects contain considerably much amount of various kinds of proteins. In this paper, quantitative amino acid analyses for such proteinaceous binders in specific art objects, e.g. Buddhist statues or paintings, were carried out by high performance liquid chromatography (HPLC) to obtain each knowledge about the differences of amino acid contents between each the binding medium and to establish the method for identification of each medium. Very small portions of samples were taken from the surfaces of the artistic objects and hydrolyzed with HCl. The products were processed to separate the amino acids which were determined by HPLC. From the results of determinations, so-called amino acid similarity for each sample was calculated by using some adhesives like isinglass, bovine skin glue, lime casein and others available from stationery houses, as controls for calculation. Comparing the pattern similarities between samples taken from the objects and controls, it can be said that mammal glues and rice paste were used for Buddhist statues and casein for paintings examined in this study.	binding media, adhesive, amino acid analysis, high performance liquid chromatography, amino acid pattern similarity	展色剤, 接着剤, アミノ酸分析, 高速液体クロマトグラフィー, アミノ酸パターン類似率	
No.35	1990	Masako, KOYANO; Takeo, KADOKURA	Crystals Found on Oil Paintings Stored in Japan	13-22	In 1971 the Art Conservation Laboratory in Tokyo first found and reported crystal growth causing obscurity and disruption of the paint layers in oil paintings. Since then the authors have investigated more than 80 cases. Usually, the crystals proved to be zinc sulfate hydrate ($ZnSO_4 \cdot 7H_2O$). An ammonium salt, $(NH_4)_2Zn(SO_4)_2 \cdot 6H_2O$, was also detected. Sulfates of calcium, barium and lead were also found in a few cases. The crystals were observed on either specific areas or on the entire surface of the paintings. The formation of crystals are related closely to the presence of ZnO or the other metal ions mentioned above in the painting materials. The sulfate ion was probably formed from oxides of sulfur (mostly SO_2) in the air by oxidation in the presence of water. As the crystals appeared particularly on paintings made between 1930 and 1950, paints containing zinc oxide and canvases with zinc oxide grounds prevalent during this period may have been responsible. The crystals were more frequent on paintings without a varnish layer, painted with lean oil paints, or where the paint layer was thinly applied, suggesting that greater contact of the pigments with the air may have contributed to the phenomenon. The proposed mechanism for the formation of the crystals is the following: water condenses on the surface of the painting under high humidity, enters the paint layer, and dissolves the water-soluble pigments. If the water absorbs sulfur dioxide from the air, the resulting solution will be acidic and react with metal oxides such as zinc oxide to form water-soluble salts. The aqueous salt solution may migrate back to the surface of the painting through the capillaries in the paint layer and form crystals upon evaporation. The highly humid conditions that prevail in Japan explains why these crystals are more frequently seen here than in other countries.	crystal formation, zinc sulfate, oil painting, high humidity, sulfur dioxide	結晶生成, 硫酸亜鉛, 油彩画, 高湿度, 二氧化硫, 黄	
No.35	1990	Nobuyuki, KAMBA	Measurement of Accumulated Values of Light Exposure and Lightfastness of Vegetable Dyes by Blue Wool Standard	23-27	Dyed silk prepared with vegetable dyes such as turmeric, safflower and kihada (Phellodendron amurense), and a blue wool standard (JIS) were exposed to a fluorescent lamp in a display case. The light intensity and energy intensity on the surface of the samples were 75 lux and $22 \mu W/cm^2$ respectively. Colour change was measured by colour difference ΔE (CIE $L^*a^*b^*$) after 3 months, 1 year and 2 years. The sample dyed with turmeric exhibited greater colour change than did the samples dyed with safflower and kihada. Lightfastness of turmeric, and of both safflower and kihada showed a similar level of Standard 1 ~ 2 and Standard 2 ~ 3 respectively. Fading of blue wool standard after light exposure of 450,000 lx · h exhibited good agreement with other experimental results.	vegetable dye, fading, lightfastness, blue scale, light exposure	天然染料, 退色, 堅ろう度, ブルースケール, 積算照度	

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No.35	1990	Torao, OHTSUKI	Studies on Eurotium tonophilum Ohtsuki Minimum Humidity for Germination and Characterization of Yellow Pigment Produced by This Fungus	28-34	In a series of previous papers, the author isolated some fungi which grow on lenses and Japanese swords, and one of these strains was identified as Eurotium (Aspergillus) tonophilum Ohtsuki. The present experiment showed that the strain can grow on the fungus growing at 60% RH. When incubated on a highly concentrated medium of sucrose, the strain produced a bright yellow pigment, from which four kinds of related compounds were separated. Physicochemical studies resulted that these pigments were composed of auroglaucin, tetrahydroauroglaucin, and two isomers of dihydroauroglaucin. One of the isomers of dihydroauroglaucin (Fig. 3-D) was a newly found product of the strain, while the other three have already been described in literatures.	<i>Eurotium tonophilum</i> Ohtsuki, minimum humidity, yellow pigment, mass spectrometric analysis, UV-VIS spectrophotometry, infrared absorption spectroscopy, nuclear magnetic resonance	ユーロチウム・トノフィラム大槻, 最低湿度, 黄色色素, 質量分析, 紫外可視吸収分析, 赤外分光法, 核磁気共鳴法	
No.36	1991	Masamitsu, INABA	Gamma Irradiation of Washi (Japanese paper) (I)	1-7	For restoration of historic papers damaged by vermiculation, it is preferable that the quality of paper used for repair resembles that of the original. This study aimed to make good quality paper for repairing historic objects made of paper using gamma irradiation method (60Co, 49-390 kGy) and thermal accelerated deterioration method (80°C, 60% RH). In addition, treatment by combining both methods was tested to see the effect. Four kinds of washi (Japanese papers), such as kozo (thin and thick), mitsumata and gampi papers, were used in this experiment. Discoloration of the papers after each single treatment was small, while that after gamma irradiation followed by thermal treatment was large. Folding endurance and tensile energy absorption (TEA) were extensively decreased by gamma irradiation. In this case, it was found that these changes in physical property showed the effect of gamma irradiation followed by thermal treatment.	washi, gamma irradiation, thermal aging, strength properties, discoloration	和紙, γ線照射, 熱劣化処理, 強度, 変色	
No.36	1991	Masako, SAITO; Kunio, YOSHIZUMI; Maresuke, KASHIWAGI; Takeo, KADOKURA	Deterioration of Natural Fibers and Color Fading of Cloths Dyed with Natural Dyes Due to the Presence of NO ₂ and SO ₂ Gases	8-17	The effects of air pollutants on textiles were investigated. The effects of NO ₂ and SO ₂ gas, the main components of air pollutants, and that of humidity on the physical properties of cotton and silk threads and also on the color fading behavior of natural dyes were examined. Both the strength and elongation of the threads were affected more strongly by NO ₂ than by SO ₂ gas. The strength of cotton began to decrease at 684 ppm·h of NO ₂ dose and even became 55% of the untreated at 1140 ppm·h, whereas change did not appear until 1140 ppm·h of NO ₂ dose for silk. The change of strength in both threads by SO ₂ gas did not appear until 1348 ppm·h. The change in elongation, however, appeared from a lower dosage for both NO ₂ and SO ₂ . The fading of natural dyes tested were greater with NO ₂ than with SO ₂ gas, showing greater change on cotton than silk. With NO ₂ gas exposure, fading was accelerated by high humidity. The above results indicate that the presence of both NO ₂ and SO ₂ must be taken into account for the conservation of cultural properties made of textiles.	deterioration, cotton, silk, color deterioration, natural dyes, NO ₂ , SO ₂ gas	劣化, 木綿, 絹, 退色, 天然染料, NO ₂ , SO ₂ gas	

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No.36	1991	Kiyoshi, TOYOSHIMA	Study of Tegurome-urushi (Handiworked Kurome-urushi) for Restoration (III)	18-25	In order to study the effects of ultra-violet radiation on urushi film, accelerated irradiation experiments were conducted by irradiating samples with UV-C or UV-B and the weight change of the samples were measured. Six kinds of small urushi films (4cm × 2.2cm, 30mg, 29 μm thick) were prepared on glass as samples, including two kinds of tegurome-urushi reported in the author's previous paper. These samples were separated into two groups, one was irradiated with UV-C while the other was preserved in the dark. The weight of the first group of samples decreased by 20% after 5354 hours of irradiation. On the other hand, the weight of the samples preserved in the dark increased with time until it became constant at 107-108% of the original after the same amount of time. This increase in weight may be the result of addition of oxygen to the side chain of urushiol and its polymers. Samples prepared from four kinds of urushi containing 5-20% perilla oil showed the same result as that of teguorne-urushi. The same experiments were also conducted with large urushi film samples having constant weight after 26 months' preservation in the dark. After 3861 hours (161 days) of irradiation with UV-C, the weight decreased by about 45% while the thickness decreased by about 10 μm. After the same amount of irradiation with UV-B, the weight decreased by about 7% and the thickness by about 1.4 μm. Irradiation of UV-B used in this experiment was about one-half of UV-B contained in sunlight. From the results of these irradiation experiments, it is presumed that UV-radiation was absorbed only by a thin surface layer of urushi film which later decomposed and disappeared in succession.	handiworked <i>kurome-urushi</i> , ultraviolet radiation, irradiation, deterioration, decomposition	手ぐろめ漆, 紫外線, 照射, 劣化, 分解	
No.36	1991	Daiill, KANG; Ryuitiro, SUGISITA	An Analytical Study of Gilt Objects in Ancient Korean Peninsula	26-34	Gilt crowns unearthed from archaeological sites of ancient Kingdoms Silla and Kaya in Korean Peninsula were subjected to be studied by an electron microscopic technique. Three pieces of gilt crowns (Silla 2, Kaya 1) were buried in resin, polished and pre-treated by a carbon evaporation method. A mapping method for microscopic images is applied to the present study using an electron microscope equipped with an energy dispersive X-ray detector. an electron beam is irradiated on each sample surface in vacuum and generated characteristic X-rays are measured and calculated. Calculations are processed with a micro-computer and elemental distributions on the surfaces of samples can be observed as visually displayed spots in an electronic display. The analytical results of two pieces from Silla crown are: Cu 98% and Pb 2% for base metal and Au 91% Ag 4% Cu 5% for gilt layer. Those of a piece of Kaya crown are: Cu 98% and Pb 2% for base metal and Au 76% Ag 6% Cu 18% for gilt layer. Although the copper contents were probably overestimated, these two crowns could be considered manufacturing by nearly same manners. An amalgam gilding technique may be used to form gold layers, the depth of which can be measured as rather thin, because Hg can be detected on the layers.	ancient Korean peninsula, gilt objects, scanning electron microscope, energy dispersive X-ray microanalyzer, mapping analysis	古代韓半島, 鍍金品, 走査型電子顕微鏡, エネルギー分散型線マイクロナライザー, マッピング分析	
No.36	1991	Gen'ichiro, KATSUKI	History of Regulations on Protection of Cultural Relics in China (1949-1991)	35-46		modern China, cultural relics, protection, regulations, history	現代中国, 文化財, 保護, 法規, 歴史	
No.36	1991	Editorial, Committee	Indexes of "Kobunkazai-no-kagaku" No. 1-35	47-97				
No.37	1992	Tetuo, SINKAI; Ichiro, NAGASAWA; Tsukasa, SHIDA; Ryuitiro, SUGISITA	Analysis of Binding Media and Adhesives in Buddhist Wooden Statues	1-11	For the study of art objects and their restoration, the identification of binding media as well as that of pigments is considerably important. Binding media consist of complicated organic compounds but only a small amount of sample can be used for analysis. For this reason analysis of binding media by means of conventional techniques has been difficult. In this paper, identification of protein containing binders such as glue used in Buddhist wooden statues was carried out by sodium dodecylsulfate polyacrylamide gel electrophoresis (SDS-PAGE) and by high performance liquid chromatography (HPLC). By using SDS-PAGE, it was not possible to distinguish mammal glue from fish glue, whereas by HPLC these two types of glue were clearly distinguished.	binding media, adhesive, SDS-polyacrylamide gel electrophoresis, high performance liquid chromatography, amino acid analysis	展色剤, 接着剤, SDS-ポリアクリル網戸ゲル電気泳動法, 高速液体クロマトグラフィー, アミノ酸分析	

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No.37	1992	Fumio; OKADA, Masaaki; SAWADA, Takayasu; KOEZUKA, Hideo; YOSHIDA	The Higher Alcohol Method for the Conservation of Waterlogged Wood	12-20	Recently, a large amount of waterlogged wood is being excavated. However, their conservation takes much time. In order to shorten the operation period, higher alcohol method was used to examine the dimensional stability of waterlogged wood. Cetyl alcohol and stearyl alcohol were used. Experiment with waterlogged broad-leaf wood with water content of approximately 500% showed that the shrinkage ratio of treated wood is less than 3% and that the treated wood keeps its dimensional stability even under high humidity condition. Compared with PEG method, treatment time was shortened. Moreover, since higher alcohol method is applicable to many kinds of objects such as fibers, textiles and metals, it is a promising method about which further research is required.	excavated waterlogged wood, higher alcohol method, dimensional stability, shrinkage ratio, conservation treatment	出土木材, 高級アルコール法, 寸法安定性, 吸収率, 保存処理	
No.37	1992	Sadatoshi, MIURA; Nobuaki, KUCHITU; Hiroshi, KIRIHARA	Investigation of Stone Statues "Caryatid and Atlantes" by Rodin	21-28	Stone statues named "Caryatid and Atlantes" (three figures) were investigated by means of X-ray radiography. Stone samples were also analyzed by X-ray diffraction and by polarizing microscopy. The stone statues were made by Auguste Rodin in about 1876 when he worked in Brussels. The stone statues were originally put on tops of pillars of a facade as ornament, then removed when the building was destroyed in 1928. Niigata Prefectural Museum of Art purchased the stone statues in 1991. The museum asked the Tokyo National Research Institute of Cultural Properties to investigate these structures and their materials before exhibition. The stone statues are said to be made of "cast stone" and reinforced by iron frames, but no one has confirmed it. Radiography revealed that iron bars of the frames were not bounded to each other. The iron bars might be unexpectedly torn off from the body if the stone statues are hung on a wall only by using the frames. Mineralogical analysis indicated that the stone statues were composed of four layers. A thin white surface layer mainly contained calcite powder. The second white layer was some millimeters thick and contained a mixture of fine grains of calcite and rough grains of lime stone and calcite. The rough calcite grains were probably made by crushing marble. The material of the third layer, the main structure of the stone statues, seemed to be similar to that of the fourth one which was mainly composed of fine grains of quartz and calcite. This material was probably artificial because its mineral structure was quite different from that of sand stone. This mixture of lime and sand or marble dust, called stucco, was very popular for walls and ornaments of a building. Thus, the stone statues are considered to have been produced by casting stucco. The iron frame was laid between the third and the fourth layers.	radiography, cast stone, stucco, stone statue, Rodin	X線透視撮影, キャストストーン, ストゥッコ, 石像, ロダン	
No.37	1992	Qu, Jianjun; Dai, Fengnian; Zhang, Weimin; Wang, Yuanping; Li, Zuixiong; Wang, Xudong	Basic Study on the Influence of Atmospheric Dustfall at Dunghuang	29-35	The influence of atmospheric dustfall on the wall paintings and sculptures of Mogao grottoes at Dunghuang has drawn much attention recently. In order to identify the origin of sand-dust, we examined the seasonal changes in the amount of dustfall, altitudinal distribution and mineralogical constituent. As a result, it was found that atmospheric dustfall originates from Mt. Mingsha. In addition, an examination of the amount of mold spores carried by dust showed that there were less inside the caves than outside and that their influence on the wall paintings is not great. Measures to prevent damage caused by dustfall is also discussed briefly in this paper.	Mogao-ku grottoes, Mt. Sanwei, Mt. Mingsha, dust fall, mineral composition, abrasion of wall paintings	莫高窟, 三危山, 鳴沙山, 大気降塵, 鉱物組成, 壁画の摩耗	

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No.37	1992	Nobuyuki, KAMBA	Performance of Wooden Strage Cases to Regulate Relative Humidity	36-45	Several types of traditional wooden strage cases for scrolls and manuscripts such as "inro", "daisashi", "kabusebuta", "kendon" -case, an old wooden safe, a plastic case for films, a packing case for transportation, and a small display case were investigated to examine their performance to regulate fluctuations of the ambient relative humidity. An experiment indicated that hygrometric half-times of wellconstructed traditional wooden cases made of paulownia are between 2 and 6 days. The other cases had almost the same values except the wooden safe. An equation which describe the RH change inside cases was derived using these values. According to this the change would be reduced to lese than 10% of the ambient daily RH change and to less than 20% of the five days periodical change, but there would be no over a period of one year.	wooden storage case, fluctuation of the ambient relative humidity, relaxation time, hygrometric half-time	収納箱, 相対湿度のゆらぎ, 緩和時間, 湿度半減期	
No.37	1992	Itsuma, KUROSAKA	Mechanism of Ammonia Formation from Concrete	46-53	The alkaline substance from concrete has already been identified as ammonia, and the condition of formation of ammonia, and the condition of formation has been studied. This paper reports on the investigation made of the mechanism of ammonia formation from concrete which adversely affects objects of art. On examining the mechanism of formation, it has been found that the amount of ammonia is determined by the aggregates in the concrete and the cause of formation is the nitrogenous impurities contained in the aggregates. Causes of ammonia formation differ in natural river aggregates and slag aggregates nitrogenous organics on the surfaces, which in the latter it is the nitrogenous substances contained in the aggregates due to nitrogen absorbed from the air during the manufacturing process.	ammonia gas, concrete building, aggregate, cement, mechanism of formation	アンモニア, コンクリート建造物, 骨材, セメント, 発生機構	
No.37	1992	Ryoji, OSHIO	Contamination Control of Alkaline Substances in Newly Built Museums	54-59	In a newly constructed building, various building materials emit many pollutants. As some of these pollutants cause deterioration of fine arts, purification of interior environment in a newly completed art museum is essential. This paper attempts to establish ammonia as one of the pollutants causing deterioration of fine arts. Furthermore, it deals with the methods of removing the ammonia pollutant and preventing the formation of ammonia.	museum, contamination, ammonia, removal, prevention	美術館, 汚染, アンモニア, 除去, 予防	
No.37	1992	Tomoaki, KAJIMA; Yoshinobu, SUZUKI	Study on Alkaline Matter Emitted from Concrete and its Removal Method	60-66	Alkaline matter from concrete is an important problem in a newly built museum because it affects art objects. This paper will deal both with the mechanism of alkaline matter formation from concrete, and the alkaline matter. Its removal method and linseed-oil-soaked paper method and chemical analysis methods such as Nessler's test, the indophenol method and gas chromatography were used. The effect of both heating concrete and using adsorbents were examined as countermeasures against alkaline matter formation from concrete. It was found that the alkaline matter contains ammonia, but it is not a simple substance; when the materials of concrete such as cement and aggregate contain amino compounds, concrete emits ammonia; higher curing temperatures make seasoning time of concrete shorter; and it is possible to remove the alkaline matter from concrete by using a suitable adsorbent.	alkaline pollutants, concrete, adsorption, air pollution, air cleaning	アルカリ物質, コンクリート, 吸着, 空気汚染, 空気清浄	
No.37	1992	Chie, SANO	Alkaline Pollutants from Newly-built Concrete Buildings—A new Method of Measuring Ammonia Gas Concentration in an Environment—	67-74	A new method of measuring alkaline pollutants from newly-built concrete buildings is prevented for regulating the museum environment. Ammonia gas in the environment is absorbed into copper (II) sulfate-containing test paper by synthesis of tetra-ammine-(monoaquo) copper (II) sulfate. The formation of this reagent was studied by using spectrophotometer and electron spin resonance spectrometer. It was proved that ammonia gas is one of the alkaline pollutants produced from newly-built concrete buildings. Moreover, it is assumed that alkaline pollutants produced from newly-built concrete buildings are harmful not only to oil paintings but also to copper-containing substances, rust in bronze, malachite green pigment, and others.	alkaline substance, ammonia gas, newly-built museum, qualitative test paper, copper (II) sulfate	アルカリ性物質, アンモニアガス, 新設博物館, 定性試験紙, 硫酸銅(II)	

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No.37	1992	Takatsugu, MATSUDA; Kenzaburo, BANNAI; Katsuhiko, HARA; Toshiyuki, TAKAMIYA; Ken'ichi, ASANUMA	Conservation of the Excavated Double Pit Hearth at Aizutakada Jugodan Site	75-79	Since the method of excavation of archaeological sites has been well established, important sites are being excavated and reports on the condition of excavation have been made. However, there are not many reports on conservation treatment given to these excavated sites prior to exhibition. This paper reports on an example of such conservation treatment.	excavated site, conservation treatment, exhibition, double pit hearth, Jomon period	出土遺構, 保存処理, 展示, 複式炉, 縄文時代	
No.37	1992	Yujiro, OGAWA	Disaster Preservation on a Library and Conservation Facilities for Cultural Properties	80-83	A flow chart for the disaster plan is shown. The following are indicated as very important points against disaster: Manuals for handling and treatment for archives damaged by flood or fire must be prepared so that not to let the damaged materials go into worse conditions. It is urgent to develop restoration techniques and system for enormous number of damaged objects. Networking among various archives institutions are necessary in order to exchange information of disaster plans and experience.	disaster plan, enormous number of damaged objects, exchange information, earthquake, flood, typhoon	災害対策, 甚大な被害, 情報交換, 地震, 洪水, 台風	
No.38	1993	Masako, SAITO; Sumiko, GOTO; Maresuke, KASHIWAGI	Effect of The Concentration of NO ₂ Gas to The Fading of Plants Dyes	1-9	The effects of the concentration of NO ₂ gas and humidity to the fading of C. I. Disperse Blue 3 and five plant dyes-hematoxylin, curcumin, carminic acid, quercetin, and indigo-were investigated. Samples were exposed to three different concentrations of NO ₂ gas (1, 5, 10 ppm) at 90 and 65% R.H. and ambient air. Their color fading behaviors were compared. The fading behavior of C. I. Disperse Blue 3 in the ambient air was very close to that of 65% R.H. 1 ppm of laboratory exposure. The fading of plant dyes was accelerated by humidity. At high humid condition (90% R.H.) the fading depended fairly on the NO ₂ gas concentration. When the NO ₂ close values were same, fadings were larger after long time exposure of 1 ppm than short time exposure of 10 ppm. To protect the fading of plant dyes from NO ₂ gas, the most important thing is to decrease the humidity first and then concentration of NO ₂ .	plant dyes, NO ₂ gas, color fading, cotton, silk	植物色素, 二酸化窒素ガス, 退色, 綿, 絹	
No.38	1993	Insook, HWANG; Masamitsu, INABA; Ryuitiro, SUGISITA	Discoloration of Lead Containing Pigments in Paintings	10-19	The color change of lead-containing pigments is one of the most serious diseases in watercolor, oil paintings and wall paintings. These pigments have a tendency to darken or brighten. It was proved that oxidation of lead containing pigments in the formation of brown-colored lead dioxide is a photochemical reaction under high humidity conditions. Therefore, we carried out some analogic experiments on the color change of three typical lead containing pigments: Pb ₃ O ₄ , PbO and 2PbCO ₃ · Pb(OH) ₂ at the conditions of illuminations under the high humidity (85% R.H.). The reasons for the chemical reactions are discussed and the results of these experiments are shown in some spectrograms, micrographs and X-ray micro-diffraction patterns. Important conclusions were drawn in our research. Due to the formation of brown PbO ₂ , red lead (Pb ₃ O ₄) and massicot (PbO) turned brown or dark when they were illuminated light under high humidity. We noticed that the brightening of red lead occurred to admixture with chalk or lead white in egg yolk or linseed oil medium on exposure to light. Lead white used in oil paintings turned yellowish on dark.	discoloration, deterioration, illumination, high humidity, X-ray microdiffraction	変色, 劣化, 光照射, 高湿度, 微小部X線回折法	
No.38	1993	Nobuyuki, KAMBA; Tadateru, NISHIURA	Dimensional Change of Wood in A Closed Case with/without Moisture Buffering Materials	20-27	An experimental study was made into the dimensional stability of wood in closed cases by using strain gages with varying ambient temperature. The study revealed that the wood in a case without any moisture buffering materials exhibited distinctively small dimensional fluctuation compared with the wood with the buffering material.	packing case, hygrosopic material, humidity buffering material, dimensional change, moisture content	梱包ケース, 吸放湿物質, 調質剤, 寸法変化, 含水率	

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No.38	1993	Nobuyuki, KAMBA; Chiaki, TANAKA	The Environmental Measurement in Packing Cases during The Transportation and The Effect of Moisture Buffering Materials	28-36	The temperature, relative humidity and air pressure within packing cases during the transportation of oil paintings have been monitored using compact solid state memory loggers. Although the temperature variation has decreased by means of the employment of 50mm thick rigid polystyrene form which has doubled thermal insulation compared with usual packing methods, thermal insulation should be improved still more. The relative humidity varies with temperature, and a rise in temperature causes a rise in relative humidity and vice versa because of a small amount of air inside of a case. Relative humidity becomes more stable if the case contains 5.8kg/m ³ of moisture buffering materials while the interior temperature changes to a great extent according to the change of exterior temperature. The moisture content of organic materials changes under such a condition of stable relative humidity with varying temperature resulting in a dimensional change of objects. It is therefore considered that the addition of moisture buffering materials to the packing cases is not necessarily to be an appropriated method stabilizing dimensional change of objects.	monitoring, packing case, thermal insulation, humidity buffering material, equilibrium moisture content	モニタリング, 梱包ケース, 断熱, 調湿剤, 平衡含水率	
No.38	1993	Toshio, OGAWA; Takenobu, YABU; Makoto, SAKAMOTO	Surface Analyses of Urushi Film Deteriorated by Outdoor Exposure	37	An urushi film was prepared through nayashi and kurome processes. The film was exposed to direct daylight. The surface of the film was analysed by X-ray photoelectron spectroscopy (ESCA), infrared absorption spectroscopy (IR), scanning electron microscope (SEM) and elemental analysis. RC-O-CR group and oxygen content on the surface increased considerably with exposure time. On the contrary RC-H and RC-O-H groups decreased. These changes occurred only on the film surface. Pinholes and cracks which would lead to brittleness of the film were observed on the surface.			
No.38	1993	Ryu, MURAKAMI; Sakae, NIYAMA	Surface Characterization of Japanese Ancient Copper Alloys Gilded by Gold Amalgam Method	45-54	Most of the ancient Japanese metal artifacts with gold surface were fabricated from copper or copper alloys. Their surfaces were treated by gilding, especially by fire gilding with gold amalgam for obtaining brilliant appearance. Scanning electron microscope (SEM) observation was done to the sample surfaces made experimentally applying traditional gilding method. On the basis of these results, the surfaces of gilded metal artifacts that were excavated from archaeological sites were characterized. It was revealed that final polishing process is important process for obtaining gold brilliance. The precipitate particles of gold amalgam, which are the most prominent feature of fire gilding, remained on the surface even after the final polishing. The trace of polishing was also recognized on the surface. It was found out that the ancient technique of fire gilding can be detected by these remarks on the surface.	surface characterization, gilding with gold amalgam, metal artifacts, scanning electron microscope, gilding process	表面キャラクタリゼーション, 金アマルガム鍍金, 金工品, 走査型電子顕微鏡, 鍍金工程	
No.38	1993	Akira, YAMAUCHI; Naoko, KANESHIRO; Rika, ISHII	A Study of Temporary Removal and Repair of Votive Picture Tablets during Repair Work of The Shrine	55-58	We conducted a temporary removal and repair for votive picture tablets and other offerings, 68 pieces in all, which had been hung on the wall of Munakata Shrine, Omishima-cho, Ehime Pref. They were damaged by aging and removed into a temporary residence to be maintained safely during the repair of the shrine. The regional people participated in this work of the tablets following our advice. We only repaired highly deteriorated parts, lest this treatment disturb conservation process in the future. After the repair of the shrine they were replaced to their original positions. The authors think that it is important to encourage a regional people to conserve their cultural property by themselves.	votive picture tablet, removal, temporary repair, regional people, conservation work	絵馬, 移動作業, 応急処置, 地元, 保存活動	
No.38	1993	Yushi, GODAI; Sakie, YOSHIMURA; Takako, KIMURA; Tetsuya, YAMADA; Naomi, UEDA; Kenji, ITO; Fumitake, MASUZAWA	Conservation Treatment and Restoration of Excavated Dippers	59-64	Dippers of bent woods are rarely found in good shape: they are always broken or modified by the earth pressure. This paper reports on conservation treatment using alcohol-xylene-resin method and polyethyleneglycol methacrylate (PEGMA) for excavated dippers. The finishing with PEGMA which improves the texture, strength and tone of the materials makes this treatment easy and greatly reduced the time for the restoration.	waterlogged wood, polyethyleneglycol methacrylate, alcohol-xylene-resin method, conservation treatment, bent wood	出土木材, ポリエチレングリコールメタクリレート, アルコール・キシレン・樹脂法, 保存処理, 曲物	

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No.38	1993	Nobuhiko, KITANO	Problem in Conservation Treatment for Excavated Urushi Objects of the Edo period (I) —The Fillers for Urushi under The Mass Production of Urushi Wares	65-79	<p>Conservation treatment and storage of excavated urushi objects appear to be more difficult than that of other excavated wooden objects, because they are composed of complex materials wooden body, ground coating and urushi coat. The number of urushi objects from the site of Edo period (17-19 C) being conserved and stored is increasing these days.</p> <p>Rough-and-ready materials and various urushi techniques employed during that period made it possible to produce urushi objects cheaply and quickly under mass production. However, this fact itself may be associated with exfoliation and shrinkage of the coating surface and thus causing difficulty in their treatment.</p> <p>In this paper the author presents some interesting facts by deciphering a series of old manuscripts. For example, it is said that a large amount of imitate mixture such as oil [egoma abura], starch [denpun], tannin [kakishibu] and protein [nikawa] blended as a filler with urushi.</p> <p>It is necessary to understand precisely the materials and manufacturing techniques used originally before applying adequate treatment, but we have not yet obtained enough information to judge their quality.</p>	excavated <i>urushi</i> objects, mass production, filler, old manuscripts, the site of Edo period	出土漆器資料, 量産型, 増量剤, 文献史料, 江戸時代遺構	
No.39	1994	KUCHITSU, Nobuaki	Deterioration of Brick at the St. Salvatorokathedraal of Brugge and its Conservation	1-7	<p>The outer part of the main tower of the St. Salvatorokathedraal of Brugge is constructed mainly of characteristic whitish yellow bricks of the nineteenth century. The surface of these bricks are generally covered with black gypsum crust of about 1.5mm thick, which is considered to be one of the causes of deterioration of this building just as in the case of structures made of marbles. Analyses of these whitish yellow bricks show that these bricks originally contain not a little calcite (CaCO₃) and that the calcite in the bricks produces the gypsum crust by the interaction with SO_x in the atmosphere and/or acid rain. Thus, it is necessary to change all the bricks containing calcite into ordinary ones to prevent the formation of black gypsum crust on the brick permanently. However, this characteristic brick with calcite is regarded valuable enough as well as the structure itself. Moreover, since the gypsum crust does not occur inside the bricks but only on the surface, it is not considered to be an essential threat on the structure at present. Accordingly, as conservation measures for this time, a simple cleaning of the surface of the bricks is proposed rather than complete replacement of the bricks.</p>	brick, deterioration, gypsum crust, St. Salvatorokathedraal of Brugge, material replacement	煉瓦, 劣化, 石膏層, プルーシュ救世主大聖堂, 材料置換	
No.39	1994	KAMBA, Nobuyuki; TANAKA, Chiaki	Relationship between Thermal Insulation and Condensation within a Packing Case	8-18	<p>Possibility of condensation within a packing case of cultural properties is discussed by means of both theory of stationary conduction of heat and results of measurements of temperature change within packing cases and ambient temperature change during transportation. A coefficient of heat transmission U (W/m²K), which is calculated by using thickness of crating materials and thermal insulation and their thermal conductivity, indicates that condensation in the cases would be decreased when U is less than 0.6W/m²K in the case of regular air craft transportation. U is decreasing with increasing the thickness of crating materials and thermal insulation, and an object within the case serves to attenuate temperature change of the case.</p>	dew point, coefficient of heat transfer of surface, thermal conductivity, coefficient of heat transmission, temperature and relative humidity	露点, 表面熱伝達率, 熱伝導, 熱通過率, 湿度	
No.39	1994	LI, Shi; SINKAI, Tetuo; INABA, Masamitsu; SUGISITA, Ryuitiro	Analysis of Binding Media Used in the Wall Paintings of Dunhuang Mogao-ku Grottoes	19-27	<p>Influence of the quality and quantity of binding media used in ancient wall paintings of Dunhuang Mogao-ku grottoes upon damages of their surfaces were studied by amino acid analysis with HPLC technique. A very small portion of each sample taken from the surfaces of such wall paintings was suspended in a little amount of water. Supernatant part of the sample which contains some amount of binding media was dried and hydrolyzed by HCl gas phase method. The hydrolytic product was injected into HPLC column to identify and determine the composition of eighteen amino acids. Amino acid similarity of each sample was obtained from the pattern of each amino acid ratio between of paint samples and that of standard samples. From the results of twenty paint samples, presence of animal glue components in every sample and their amounts were calculated in terms of total quantities of amino acid. We believe that these data can be useful as elementary information for the restoration and conservation of the wall paintings of Dunhuang Mogao-ku grottoes.</p>	Dunhuang Mogao-ku grottoes, wall painting, binding media, high performance liquid chromatography, amino acid composition	敦煌莫高窟, 壁画, 展色剤, 高速液体クロマトグラフィー, アミノ酸組成比	

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No.39	1994	ISHII, Ritsuko	Efficiency of Strengthening Methods in Paper Conservation —Discussion—	28-38	Four methods, which are commonly used to strengthen brittle paper, were applied on three different papers : a) european rag paper, 17th cent, b) mechanical pulp paper, 1893, German production; e) mechanical pulp paper, 1948, Japanese production. The strengthening methods applied were : 1) leafcasting ; 2) paper splitting, using different adhesives for the core paper, ie. a) starch paste, b) methyl cellulose, c) acrylic emulsion; 3) laminating with commercially available acrylic coated Japanese paper ; 4) coating with Parylene in the gas phase. Additionally the papers were washed before treatment. Any paper was submitted to accelerated aging 90°C, 50% R.H., 518 h. The following tests were performed on each sample (not treated not aged ; treated not aged ; not treated aged ; treated and aged) pH, tensile strength, tensile strength post fold, colour change (CIE Lab method) and thickness. Moreover, the different states of treatment (of 3(papers) × 2(aging states) × 8(6 treatments+1 washed+1 control) =48) were submitted to the personal assessment of four experts for paper conservation. As a general result a certain superiority of leafcasting can be stated, even if this method has only little actual strengthening effect.	archive, strengthening metho, leaf casting, paper splitting, laminating	紙資料, 補強方法, リーフキャストイング, paper splitting, ラミネーティング	
No.39	1994	OKADA, Fumio; NARUSE, Masakazu; TAGAWA, Machiko; KITAMURA, Shousai	Black Pigments in Excavated Black Urushi Objects of the Early Heian Period	39-48	This paper deals with black pigments used for Japanese urushi objects in the ninth century. A few documents in those times mentioned that "haizumi," which probably meant lamp black, was used as a black pigment for mixing with urushi in order to make black urushi layer ; however, the presence of the black pigment had not been proved. Urushi objects used for this investigation were excavated from Nagaoka Capital Site and Heian Capital Site in Kyoto. Small samples were taken from these objects for the preparation of thin sections to be observed with optical microscope in transmitted light. A black pigment was observed in urushi layers of each specimen, and the particle size and the distribution state of the black pigment used were similar to those of lamp black which was mixed with urushi to make black urushi experimentally. Each specimen had one or two ground layers which consists of urushi and earth, and two to four black urushi layers. These lacquering technique coincide with those described in documents of the mid-eighth century.	urushi, black pigments, lamp black, pine soot	漆器, 黒色顔料, 掃墨, 松煙	
No.39	1994	OKADA, Fumio; NARUSE, Masakazu; KITAMURA, Shousai	Scientific Investigation of Excavated Makie Lacquerware Techniques	49-60	This paper discusses the scientific investigation of six makie lacquerware excavated from Heijo Palace Site in Nara, Heian Capital Site and Toba Detached Palace Site in Kyoto, and Hakata Site in Fukuoka from the eighth through the twelfth centuries. Optical microscopy and X-ray fluorescence analyses were applied to characterize the techniques and materials used. The following results were obtained. I. Gold, silver, and byakuro (tin-lead alloy) were confirmed as makie powders in the samples. II. While most of the gold makie powders in each sample were ground and polished to reveal their surface, most of the silver and byakuro makie powders in each sample were buried in urushi layer. III. Silver malie powders used in the late Heian period had sharp edges. IV. Two structures of ground layers were confirmed: urushi and earth, i.e. jinoko-urushi ; urushi, earth and charcoal powder. V. Black urushi layers contain haizumi (lamp black or pine soot) as a black pigment.	makie, lacquerware, gold powder, silver powder, byakuro powder	蒔絵, 漆器, 金粉, 銀粉, 白蠟	
No.39	1994	OKADA, Fumio; NARUSE, Masakazu	Scientific Investigation of Lacquerware Excavated from Wan Hsu's Tomb in Ro-Rang	61-66	This paper discusses the scientific investigation of Chinese lacquerware excavated from Wan Hsu's Tomb of the late Han dynasty located in Pyongyang city. Small samples were taken from twenty two objects for the preparation of thin-sections, and applied urushi layers and ground layers were observed by optical microscope in transmitted light. The objects can be classified into two types ; Type 1 with fabric supports and Type 2 without fabric supports. Furthermore Type 1 can be classified into three subtypes and Type 2 into two subtypes depending on ground making techniques.	Chinese lacquerware, Ro-Rang, thin-section, fabric support	中国漆器, 楽浪, 薄片, 布着せ	

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No.39	1994	SAITO, Masako; GOTO, Sumiko; KASHIWAGI, Maresuke	Effect of the Concentration of NO ₂ Gas to the Fading of Fabrics Dyed with Natural Dyes	67-74	<p>The effects of the concentration of NO₂ gas and humidity to the fading of silk and cotton dyed with ten natural dyes were investigated. Samples were exposed to three different concentrations of NO₂ gas (1, 5, 10ppm) at 90 and 65% RH.</p> <p>It was found that fading was accelerated by humidity.</p> <p>At high humidity condition (90% RH), fading fairly depended on the NO₂ gas concentration. When the NO₂ dose values were the same, fadings were larger in a long time exposure of 1 ppm than in a short time exposure of 10 ppm. At 65% RH fading did not depend on the concentration of NO₂ gas. Fading behaviors of the natural dyes at 65% RH were very close to those of their main colorants, as were reported before, but at high humidity fading of the natural dyes was smaller than that of the colorants.</p> <p>To protect the fading of natural dyes from NO₂ gas, then, decreasing the humidity is most effective.</p>	natural dye, plant colorant, NO ₂ gas, color fading, cotton and silk	天然染料, 植物色素, 二酸化窒素ガス, 退色, 綿と絹	
No.39	1994	TSUKADA, Masahiko; SINKAI, Tetuo; INABA, Masamitsu; SUGISITA, Ryuitiro	Application of Organic Alkaline Reagents for Identification of Drying Oil	75-80	<p>The application of two organic alkaline reagent, tetramethylammonium hydroxide (TIVIAH) and m-trifluoromethylphenyltrimethylammonium hydroxide (m-TFPTAH), as the reagent for the identification of drying oil in the dried paint films with GC-MS is studied. Both two reagents showed good results for obtaining the Palmitic/Stearic ratios from various oils, comparing with the "cliazomethane methylation method", but TMAH required higher temperature for methylation. Therefore, m-TFPTAH seemed to be superior in the purpose, and is supposed to make possible to identify the drying oil from smaller sample with simpler method than diazome-thane methylation.</p>	binding media, drying oil, fatty acid analysis, identification, gas chromatography-mass spectrometry	展色剤, 乾性油, 脂肪酸分析, 同定, ガスクロマトグラフ質量分析 spectrometry	
No.39	1994	ISHII, Ritsuko	Efficiency of Strengthening Methods in Paper Conservation —Practical Consideration—	81-92	<p>The article describes three strengthening methods ; the materials used, the working operation and their effect.</p> <p>1) Leafcasting. A very thin web of fibers, previously dyed according to the colour of the object, is produced in the leafcasting machine and is laid on both surfaces of the brittle object in a wet state. This method is superior and quicker to traditional hand-restoration using Japanese paper and starch paste, because when leafcasting, one can fill missing areas and strengthen the paper at the same time. Besides, the result seems to be most appealing from the aesthetic point of view.</p> <p>2) Paper splitting. The brittle object is split into two parts, using gelatine-coated filter paper as support. Then a core of Japanese paper is put between the two parts using starch past, methyl cellulose etc., as adhesive and the support paper are removed. This method has a good strengthening effect, but the objects are subjected to heavy treatment.</p> <p>3) Laminating. A Japanese paper commercially coated with an acrylic is heat-set on the surface of the object. The strengthening effect is quite good. For objects sensitive to water this method is the only possible choice, but there are aesthetic problems. However, it is the quickest of all the methods.</p>	leaf casting, paper splitting, laminating, restoring, strengthening method	リーフキャストイング, ペーパーベースブリッティング, ラミネーティング, 修復処置, 補強方法	
No.39	1996	KITANO, Nobuhiko	Problem in Conservation Treatment for Excavated Urushi Objects of the Edo Period (II) —Techniques for Producing Synthetic Pigment bengara Contained in Red-colored Urushi Objects—	93-102	<p>Bengara (red oxide : Fe₂O₃) and shu (vermillion : HgS) are two typical pigments which had been used in red-colored urushi objects ; of the two, bengara especially, is found even in objects made in periods later than the Edo period. Ordinary bengara is a natural pigment made from hematite. However, it was found that through research of some old manuscripts, much synthetic bengara had been produced during the Edo period with different techniques, resulting in some with poor quality under mass production.</p> <p>This paper presents the general process used in making bengara during the Edo period, consulting some old manuscripts and testimonies of some experienced workers who made synthetic bengara.</p> <p>It was found that workers of the Edo period used weathered roha (FeSO₄ · 7H₂O) as raw material, roasted it and then refined it in water.</p>	old manuscripts, red-colored urushi objects, synthetic bengara, natural bengara, roha, FeSO ₄ · 7H ₂ O	文献史料, 赤色系漆, 人造ベンガラ, 天然ベンガラ, ローハ, 緑礬	

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No.40	1996	YOKOSHIMA, Fumio; KAMBA, Nobuyuki; SAKAMOTO, Minoru; SAKAMOTO, Kazumichi	Characterization of White Lead Particles Reproduced with Manufacturing Methods of the 19th Century in Europe	1-9	We carried out the reproduction of white lead in a laboratory by means of the manufacturing methods of the nineteenth century; the methods were the German process and the French process. We characterized the white lead particles obtained with the electron microscope. The particles of white lead by German process are from 1 to 10 μ m and formed polyhedron and stick shapes, while the particles by French process are smaller from 1 to 2 μ m and mostly spheres. Some of the particles have hexagonal sections in spindle shape. We can therefore discriminate between white lead particle made by the German process and those by the French process.	oil painting, basic lead carbonate, the nineteenth century, particle form, scanning electron microscope	油彩画, 塩基性炭酸鉛, 19世紀, 粒子形状, 走査型電子顕微鏡	
No.40	1996	TSUKADA, Masahiko; SINKAI, Tetuo; INABA, Masamitsu; SUGISITA, Ryuitiro	The Changes of Fatty Acids Compositions during the Drying of Painting Oils	10-23	The effect of lead, titanium, and zinc whites on the drying processes of linseed, poppy seed, and walnut oils were examined by analyzing the changes in the amounts of fatty acid components, using gas chromatography-mass spectrometry. Also the effect of the addition of turpentine and the difference between fresh linseed oil and pre-polymerized oils (stand oil and sunthickened linseed oil) were studied. All samples showed a good correspondence of the decrease of linolenic and linolenic acids to the drying of the paint films. The rate of decrease of unsaturated fatty acids was slower for walnut oil than for the other fresh oils in decreasing. The most effective pigment as a drying agent was lead white. Zinc white produced a skin on the paint surface, which seemed to inhibit the drying of the whole paint layer, and the decrease of unsaturated acids retarded. Different pre-polymerization methods showed different effects on the drying. Sunthickened linseed oil seems to contain many starting points for auto-oxidation, and was rapidly auto-oxidized by exposure to air. On the other hand, the pre-polymerization of stand oil seems to lead to cross-linking rather than auto-oxidation, and therefore showed a slower decrease of unsaturated acids than fresh linseed oil in the successive auto-oxidation.	binding media, drying oil, fatty acid analysis, natural aging, gas chromatographymass spectrometry	展色材, 乾性油, 脂肪酸分析, 経時変化, ガスクロマトグラフィー質量分析	
No.40	1996	KIGAWA, Rika; YAMANO, Katsuji	Accelerated Mortality of <i>Sitophilus zeamais</i> and Japanese Common Museum Pests by Application of <i>p</i> -dichlorobenzene to the Low Oxygen Atmosphere Fumigation	24-34	Methyl bromide has been widely used as an insecticide for treating pests in museums. However, since increased awareness of the damage that the chemical causes to the environment, the collections, and the health of operators, several new alternatives have been developed. One of the alternatives, low oxygen atmosphere treatment has been reported to be effective against a number of major museum pests in recent years. However, treatment periods for low oxygen atmosphere are usually longer than those in conventional fumigation. In order to facilitate the practical application in museums, it seemed necessary to shorten the treatment periods. In this study, we added small amounts of <i>p</i> -dichlorobenzene into fumigation packages with a low oxygen atmosphere which was attained with Ageless [®] oxygen scavenger. <i>Sitophilus zeamais</i> Motschulsky and certain stages of several common museum pests in Japan, including <i>Lyctus brunneus</i> (Stephens), <i>Attagenus japonicus</i> Reitter and <i>Stegobium paniceum</i> (Linnaeus), were tested. Accelerated mortality was observed with all the tested insects except for <i>Attagenus japonicus</i> . Larva of <i>Attagenus japonicus</i> were so sensitive to low oxygen atmospheres that we did not detect any acceleration in mortality with <i>p</i> dichlorobenzene treatment. On the other hand, marked acceleration in mortality was observed with insects which were more tolerant to low oxygen atmospheres.	pest control method, low oxygen atmosphere, <i>p</i> -dichlorobenzene	害虫防除法, 低酸素濃度環境, パラジクロロベンゼン	

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No.40	1996	KITANO, Nobuhiko; KOEZUKA, Takayasu	An Experiment for the Production of Bengala Used in the Edo Period	35-47	<p>Synthetic <i>Bengala</i> (iron oxide red: Fe_2O_3) is one of the most popular red pigments used in the <i>Edo</i> period.</p> <p>In the general process of <i>Bengala</i> manufacture at that time, workers used <i>roha</i> ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) as raw material. They roasted the <i>roha</i>, and refined it in the water. We made some experiments in making <i>Bengala</i>, in order to understand its character. The results we obtained are as follows.</p> <p>(1) During the roasting process, the color of the raw material changed gradually from ① to ⑥: ① green or blue~② yellow~③ yellow orange~④ red~⑤ reddish brown~⑥ black.</p> <p>(2) The chemical character and crystal form changed at the same time. The phenomenon is as follows. Raw material ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) [Melanterite]~intermediate material ($\text{Fe}_{4.67}(\text{SO}_4)_6(\text{OH})_2 \cdot 20\text{H}_2\text{O}$ and $\text{Fe}_{4.67}\text{O}_3(\text{SO}_4)_{1.6} \cdot 63\text{H}_2\text{O}$) [Copiapite etc.~red color material (Fe_2O_3) [Hematite]~④ over roasted material (Fe_3O_4) [Magnetite].</p> <p>(3) It was found that the adequate roasting temperature is about 650-700°C to produce iron oxide red. But this condition is so delicate that it is very difficult to keep this range and produce pure iron oxide red by hand-made method.</p> <p>(4) Much of sulfur component was remained in the roasted materials, and made the quality unstable especially under the high humidity condition (about more than 80% relative humidity).</p> <p>(5) To obtain the high quality <i>Bengala</i>, the sulfur component should be washed away. During the washing process, we confirmed precipitation of iron hydroxide ($\text{Fe}(\text{OH})_3$) in the water. It was found that, the synthetic <i>Bengala</i> (as a red-color pigment) is composed the mixture of iron oxide (Fe_2O_3) and iron hydroxide ($\text{Fe}(\text{OH})_3$).</p>	synthetic <i>Bengala</i> , roha, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, roasting temperature, iron oxide, Fe_2O_3 , refining process in the water, iron hydroxide, $\text{Fe}(\text{OH})_3$	人造ベンガラ, ローハ, 人造緑礬, 加熱温度, 酸化第二鉄, 水飩作業, 水酸化鉄	
No.40	1996	TAKATSUKA, Hideharu	Experimental Study of the Reactions in Pre-modern Iron Smelting Furnaces Using Thermal Analysis	48-62	<p>Experimental studies using iron ore, i. e. magnetite, and iron sand, i. e. titanomagnetite, as the raw material were carried out to investigate the reactions in ancient iron smelting furnaces. The raw material was powdered and sieved to a grain size of 53 to 100 μm. It was mixed with charcoal and heated from room temperature to 1500°C in a thermal analyzer under Ar gas atmosphere. Thermogravimetry and differential thermal analysis were carried out. The products were studied in a scanning electron microprobe with an X-ray micro analyzer. The temperature ranges of reduction were different between iron ore and iron sand; the former was 900°C to 1300°C, the latter was 950°C to above 1300°C. During the heating and reduction of iron ore, fayalite was produced between 1100°C and 1200°C in the slag and disappeared at 1300°C. In the case of iron sand, the minerals in the slag were dependent on the temperature; i. e. ulvöspinel at 1100°C, ulvöspinel and ilmenite at 1200°C, rutile at 1300°C. In both cases metallic iron absorbed carbon at higher temperature and flake-like graphite was observed in the metal above 1200°C. These results are corresponding to the products observed in ancient iron smelting furnaces.</p>	Thermal analysis, iron ore, iron sand, fayalite, Ulvöspinel	熱分析, 鉄鉱石, 砂鉄, ファイアライト, ウルボスピネル	
No.40	1996	YOSHIZUMI, Kunio; MATSUMOTO, Munehisa	Dose-Response Characteristics of the Fading of Silk Fabrics Dyed with Suou (Caesalpinia sappan) due to Sun Light Irradiance and Effects of Mordants	63-71	<p>UV-A and UV-B radiation from sunlight were continuously measured in downtown Tokyo. Simultaneously, dyed fabrics were exposed to sunlight. The relation between accumulated UV-A and UV-B intensities and fading levels of the samples, shown in color differences, were compiled as dose-response characteristic curves. Fabrics dyed with the synthetic dyestuff C. I. Acid Blue 83 and the vegetable dye Suou (Caesalpinia sappan) were examined as test pieces. UV-A was found to be a better index to characterize the lightfastness properties than UV-B for the dyed fabrics tested here. The effect of mordants on the lightfastness of Suou was found to be in the following order: Camellia ash = alum < ferric sulfate</p>	dose-response characteristics, <i>Caesalpinia sappan</i> , ultra violet-A, ultra violet-B, blue scale of Japan industrial standard	量・反応特性, 蘇芳, A領域紫外線, B領域紫外線, JISブルースケール	

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No.40	1996	ITO, Yoshimi; MATSUDA, Yasunori; TSUKADA, Masahiko	Creation of a FT-IR Spectral Library for Materials of Artistic Paintings: Problems in Its Development and Application	72-79	<p>FT-IR (Fourier Transform Infrared Spectroscopy) is a very useful tool in conservation science, but for conservators with having little chemical background it is difficult to take complete advantage of the method. In such case, a FT-IR spectral library can be of great help. This paper describes our attempt to create a FT- IR spectral library for materials of artistic paintings, and the problems in its development and application.</p> <p>To date, this library consists of 156 spectra of artistic materials, including pigments, drying oils, varnishes, etc. As the spectra are stored on a computer, the automatic-searching and matching of spectra can be easily and speedily done. Considering the practical application of this library, we discussed some problems for the conservation field, such as the collection of spectra of mixed or deteriorated materials, the improvement of the automatic-searching program, and the distribution of this library.</p> <p>Also some other institutes are creating, or have created, and are using FT-IR spectral libraries for the materials of cultural property. We suppose that the trend of using spectral libraries will grow more and more. Therefore, it is necessary to develop a new FT-IR spectral library for the many conservators who want easy access and use and, at the same time, to study methods for combining libraries.</p>	spectral library, Fourier Transform Infrared Spectroscopy, painting materials, pigments, binding media	スペクトルライブラ リー、フーリエ変換型 赤外分光分析法、絵画 材料、顔料、展色剤	
No.41	1997	YOKOSHIMA, Fumio; KAMBA, Nobuyuki; SAKAMOTO, Kazumichi	Experimental Remaking of White Lead Ground Layer for Oil Paintings during the Early Meiji Period (Late Nineteenth Century)	1-10	<p>This study explores the specific structure and character of the oil ground of canvas paintings in early Meiji period (late 19th century). In particular, attention is paid to the fine white dots reflected in X-ray radiographs of ground layers. This study operates under the assumption that the form and the size of the white lead particles which were included in the oil ground are intimately related to the character of canvas paintings of this period.</p> <p>White lead used for the test was reproduced using the same method as an old German and French ones of the nineteenth century in Europe. Each group of the test pigment were ground with linseed oil and were spread on canvases. The cross-section of the ground layers were checked with a scanning electron microscope to compare with the radiographs of these under microscope.</p> <p>The existence of white dots was confirmed under microscopic analysis of radiographs of oil ground layers containing chalk and unwashed Germanmethod white lead. These were fine-grained, and their number decreased in the radiographs of the ground layers which contained washed white lead. Some masses which were composed of many fine particles and some large particles over 10 μ m were found here and there on the cross-section of ground layers. The numbers of these masses and large particles tended to decrease as the ground layers included more washed white lead. Thus, the proportion of white dots detected in radiographs accurately reflected the proportion of masses and large particles which were observed in the cross-sections of ground layers. These results lead to the conclusion that the white dots were reflections of masses or big particles of white lead.</p> <p>Conversely, white dots were not observed in radiographs of the ground layers including French-method white lead, but spherical sections of less than 5 μ m were observed in the cross-section.</p>	oil painting, basic lead carbonate, ground layer, X-ray radiograph, scanning electron microscope	油彩画、塩基性炭酸 鉛、地塗り層、X線写真、 走査型電子顕微鏡	

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No.41	1997	MATSUI, Toshiya; MURAKAMI, Ryu; TAKADA, Jun; NORIOKA, Minoru	Study of Plaster Used for Landscape and Buildings Excavated from the Donjon of Okayama Castle	11-24	<p>In ancient times plaster was mainly used as under-layer for paintings and finishing for walls. In the Edo period, it began to be used for various other purposes: to prevent leakage of garden ponds, to join pipes, to make floors, and so on. It was mixed with sand, resin, salt and other materials depending on the situation.</p> <p>Okayama Castle was originally built in 1597. It was reconstructed many times until its destruction in 1868. Recently, landscape and some buildings were excavated from the donjon of Okayama Castle. The items excavated at these sites included the bed of a garden pond, the joint of drain pipes, earthen-floor and pavement stones. The characteristics of the items were investigated by using scanning electron microscope with X-ray analyzer (SEM with EDX), X-ray fluorescence analyzer (XRF), fourier transform infrared spectrophotometer (FTIR), X-ray diffraction analyzer (XRD) and particle size distribution analyzer. It was revealed that plaster was not used before the 1660's at this site. Almost all the building materials consist of soil and calcium carbonate (CaCO₃). This suggests that the mixing ratio of plaster to soil differed in usage; its concentration to soil was below 30 wt%. It was also shown that the distribution of plaster differed according to types of soil. In clay type soil, the distribution of plaster was granular and zonal. In gravel type soil, which contains quartz and feldspars, plaster filled the gravel gaps. Different building materials were used at different points even if the buildings were constructed in the same age: for the storage materials of the garden pond, clay type soil was used; for the building materials of the underground cellar, gravel type was used. It is considered that the difference in shrinking rate of these types of soil was known in those days. Some information about characteristic aspects of plaster studied in this report will be useful in discussing materials used for landscape and buildings.</p>	plaster, landscape, soil type, mixing ratio, construction technique	漆喰, 園池, 土壌タイプ, 配合比, 施工技術	

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No.41	1997	MATSUDA, Takatsugu; HIMESHIMA, Tomoharu; WATANABE, Takayuki; and TOYODA, Takuo	Efficiency of Oxygen Absorbent for Metals Applied to the Unearthed Metal Objects	25-37	<p>A New absorbent system called RP system was utilized for industrial metal materials in 1993. This system consists of a gas absorber (RP agent) and packaging materials. The gas absorber consists of an organic oxygen absorbent and an inorganic dessicant. Its specific feature is that the absorber absorbs oxygen, water vapor and corrosive gases. The packaging materials are prepared from ceramics deposited laminated films called ESCAL and PTS. These films do not transmit gases much as do ordinary films. ESCAL possesses an oxygen permeability of $0.05\text{ml}/(\text{m}^2 \cdot \text{day} \cdot \text{atm})$ and a water vapor transmission of $0.01\text{ml}/(\text{m}^2 \cdot \text{day})$ at 25°C and $60\% \text{RH}$.</p> <p>This system was applied to rusted iron plates and unearthed iron objects. Iron plates which were rusted with $10\% \text{NaCl}$ aqueous solution were put into bags (ESCAL, OV and polyethylene) with anti-corrosives (RP agent, Ageless and silica gel). A few combinations of bags and anti-corrosives were tested. After sealing the bags, these samples were kept at 25°C and $60\% \text{RH}$ or at 60°C and $95\% \text{RH}$ for 12 months. The concentration of oxygen and the relative humidity in the bags were determined. The weight of rusted iron plates were measured, too. The concentration of oxygen was kept very low in bags of RP agent/ESCAL and Ageless/ESCAL from the beginning to the end. Relative humidity was kept very low in the bags of RP agent/ESCAL and silica gel/ESCAL. The weight of rusted iron plates did not increase in bags of RP agent/ESCAL, Ageless/ESCAL and silica gel/ESCAL after 12 months. In addition, the change of the gloss value of iron and brass plates was determined with anti-corrosives and a bag of Al laminated film. These plates were put into the bag with RP agent, Ageless or silica gel. After sealing the bags, they were kept at 60°C and $95\% \text{RH}$ for 2 months. The change of gloss on iron and brass plate was not observed on RP agent only.</p> <p>RP system was applied to iron objects excavated from a same site in 1993 and 1994. Iron objects excavated in 1993 were put into polyethylene bags without any agents and kept in the storage room of Fukushima museum. Iron objects excavated in 1994 were put into bags of PTS with RP agent and kept in the storage room, too. After 12 months, a change in their shape was observed in bags of polyethylene and many cracks were also observed by X-ray photograph. No change of shape was observed in those which were put into bags of PTS with RP agent after 18 months without one sample. Only one crack was observed in one sample by X-ray photograph.</p> <p>Unearthed metal objects in an other site were tested with RP agent and bag of PTS film. The same result was observed.</p>	oxygen absorbent, rust protection, preservation, metal objects, hermetically sealed packing	脱酸素材, 防錆, 保存, 金属製遺物, 密封包装	
No.41	1997	MIURA, Sadatoshi	Evaluation of the Safety of S-shaped Hangers for Paintings	38-45	<p>One of the largest damage of the Kobe earthquake which occurred on 17th January 1995 was the fall of paintings from racks in storage. The paintings slipped down from hangers distorted by the earthquake. The author evaluated the safety of steel hangers of different S shapes and of thickness by testing their tensile strength. He also evaluated the strength of nylon lines commonly used for fixing an object. The result showed that the strength of hangers does not depend on the tensile strength of steel itself but on its bending strength. Although they have the same thickness of 5mm, a straight-shaped S hanger was about six times stronger than a largely bent one. The author concluded that a steel hanger of more than 5mm thickness with a straight-shaped S would have enough strength against an earthquake. Since all nylon lines of three different thicknesses and with two different knots (bowline knot and single knot) had lower strength (only some kgf) than expected, they must not be used alone to fix a heavy object (more than some kilograms). It must be remembered that the catches for the hanger and for the nylon line are also other important factors. They should be carefully fixed to a painting.</p>	painting, earthquake, S-shaped steel hanger, strength, nylon line	絵画, 地震, S環, 強度, ナイロン製釣り糸	

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No.41	1997	SANO, Chie	Alkaline Pollutants from Newly-built Concrete Buildings (II) – ESR Studies of Color Changes of Linseed Oil and Some Copper Pigments Used in Japanese Paintings–	46–53	“Linseed Oil Test Paper”, a qualitative filter paper soaked up with linseed oil, is being used for detecting alkaline pollutants in newly-built museums in Japan. This test paper becomes dark in alkaline atmosphere. The reaction mechanism of the color change was studied by esr method in this report. It was suggested that copper impurities in linseed oil would play a major role in coloring by forming copper ammine complexes. Copper pigments like rokusho, malachite, and yaki-rokusho, burnt malachite, used in Japanese paintings were also tested in a newly-built museum. Changes of their chemical forms to copper ammine complexes were observed by esr method after six-months' exposure.	museum, indoor air pollution, ammonia gas, linseed oil, copper pigments	博物館, 室内空気汚染, アンモニアガス, マニ油, 銅顔料	
No.41	1997	MATSUDA, Yasunori	Non-destructive Analysis of Yellow Natural Dyestuffs by Three-Dimensional Fluorescence Spectroscopy	54–63	Three-dimensional fluorescence spectra of silk fabrics dyed with several traditional yellow dyestuffs, and faded samples of accelerated aging test were measured for the purpose of characterization of these samples. Then, an ancient dyed textile showing greenish-yellow shade was examined with the same technique in order to identify the dyes used. From the results, three-dimensional fluorescence spectroscopy was proved to be a useful method, because it can provide much more information for natural dyes than the previous techniques. First, one to one correspondence can be made between a yellow dye and a spectral peak position. Second, the contour lines of fluorescence intensities can supply fingerprint-like information for the corresponding dyes. Furthermore, the faded sample exposed to intense light demonstrated that the spectral pattern of a natural dye on silk slightly changed though it showed large color difference value. It was consequently considered that three-dimensional fluorescence spectroscopy was very effective for identifying natural dyes on silk. This consideration was proved to be correct through the identification of a yellow dye on ancient colored fabrics. Nevertheless, some limitations on the application of this method to identifying dyes were found.	non-destructive analysis, three-dimensional fluorescence spectroscopy, natural dyestuff, light irradiation, accelerated aging test, identification	非破壊分析, 三次元蛍光スペクトル法, 天然染料, 光照射, 加速劣化試験, 同定	
No.41	1997	KAMBA, Nobuyuki	Relative Humidity Variation and Dew Condensation within a Protective Enclosure for Glass Plates	64–67	Variation of relative humidity and susceptibility of dew condensation within a protective enclosure such as a sealed envelope are discussed by measuring temperature and relative humidity change. The results show that a change of temperature in the enclosure causes change of relative humidity in the same direction with the existence of hygroscopic materials such as gelatin if the amount of air is small. The temperature of inside air may reach a dew point if the enclosure is cooled rapidly.	dew condensation, relative humidity, temperature, glass plate, protective enclosure	結露, 相対湿度, 温度, ガラス乾板, 密封包材	
No.41	1997	TSUKADA, Masahiko; MAKINO, Takao; MATSUDA, Yasunori; and MAKINO, Urara	Material, Technique, and Restoration of a Cabinet with Hwagak-like Decoration	68–77	Hwagak is one of the traditional Korean techniques for the decoration of wooden objects using cow horns: a plate made of horn is thinned till it becomes semitransparent, painted on the reverse side, and applied to the objects. This technique was developed especially during the period of the Yi dynasty, but because of its complicated and laborious process, there are only a few artists who work with this technique nowadays. And few people know that there are some works decorated with Hwagak-like technique using artificial materials, which is much easier to prepare. Recently the authors took charge of the restoration of a cabinet with Hwagak-like decoration. From the preliminary research, it seemed that the decoration of this work was made of materials other than cow horns. In order to decide how to treat this cabinet, we analyzed the material used in its decoration. It was found out that the Hwagak-like plate was made of cellulose nitrate, and the paints composed from some recent synthetic pigment like emerald green. From this result, we discussed the problems for the conservation and the restoration of this work, the treatment applied so far, and the policy of the reproduction of the missing plates and paints.	cellulose nitrate, Hwagak-like decoration, Hwagak, restoration, FT-IR	セルロイド, 疑似華角飾り, 華角, 修復, フーリエ変換式赤外分光法	

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No.41	1997	CHEN, Qing; SINKAI, Tetuo; INABA, Masamitsu; SUGISITA, Ryuitiro; and HUANG, Guozhang	An Analysis of Pigments from Sung and Yuan Dynasty Tomb Wall Paintings of Fujian Province in China	78-87	Sixty pigment samples taken directly from wall paintings of Sung and Yuan dynasty tombs in the Jiangle, Youxi and Yanqian regions of Fujian, China were analyzed. Pigment colors analyzed were red, yellow and black. Analytical methods included surface and cross-section examination by optical microscope and by X-ray microanalyzer, and mineral identification by micro X-ray diffractometer. According to this analysis, the pigments used in the tomb paintings were determined to be vermilion and Chinese ink in the Yanqian region, iron oxide, yellow ochre and Chinese ink in the Youxi region, and vermilion, yellow ochre and Chinese ink in the Jiangle region. The tomb paintings of these three regions were all painted on the surface of a so-called plaster wall, or a lime ground painted over a brick base. Analysis revealed that the ground layer of the plaster wall was calcite (CaCO ₃). Moreover, since calcite was found present on the samples' outermost surface, it was proposed that a very thin layer of calcite may have been transferred from the ground layer to the paintings' surfaces and recrystallized on them.	wall paintings, pigment, china, analysis	壁画, 顔料, 中国, 分析	
No.41	1997	KITANO, Nobuhiko	Problem in Conservation Treatment for Excavated Urushi Objects of the Edo Period(III) -Techniques for Producing Synthetic Pigment Shu (Vermilion) Contained in Red Colored Urushi Objects-	88-100	Shu (vermilion) pigments used in red-colored urushi objects during the Edo period show a variety of color and crystal form, and some even change color. In order to study the characteristic of these shu pigments, some old manuscripts and testimonies of some experienced workers who made shu were consulted. As a result it was discovered that there were two types of shu —sinnabar and vermilion— and that the latter was used for urushi objects. The method used to process shu followed traditional techniques transmitted from China and was composed of two processes:the roasting process in which sulfur (S) and mercury (Hg) were mixed and roasted and the refining in water process in which the crystal HgS thus produced was ground and washed in water containing niter (KNO ₃). It was found that in the case of the manufacture of shu in the Edo period, differences in the manufacturing process such as the ratio of mercury and sulfur, the roasting temperature, the method of refining in water and the distribution of shu crystal distribution influenced the quality and tone of the shu.	old manuscripts, vermilion · HgS, sinnabar ·HgS, roasting process, refining process in the water	文献史料, 水銀朱, 天然辰砂, 加熱工程, 水簸工程	
No.41	1997	INOKUCHI, Satoko	A Report on Painting Cleaning Controversies at the National Gallery	101-110	The results of the restoration of paintings provoke great public interest as well as outcry. The restoration project of Michelangelo's frescoes in the Sistine chapel that began in 1980 has caused considerable controversy. However, the Sistine case is only the latest instance of a strong argument. Disputes on restoration are repeated in major galleries such as the Louvre in Paris and the National Gallery of Art in Washington, D.C. One reason for this is cleaning, though it is only a stage in the whole restoration process. Cleaning often changes the appearance of a work and can give a shock to people who are familiar with its previous state. The National Gallery in London is not an exception. Since the first controversy in 1846-53, the Gallery has been faced with recurrent disputes. A main concern in this report is the first controversy started in 1846. The author sets out to explain what happened in the Gallery and how contemporary people reacted to the event. In the conclusion, recent considerations of problems arising in painting restoration are discussed.	painting restoration, cleaning, controversy, the National Gallery, history	絵画修復, クリーニング, 論争, ロンドンナショナルギャラリー, 歴史	

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No.42	1998	MATSUI, Toshiya; MURAKAMI, Ryu; TAKADA, Jun	Influence of Chlorine and Sulfur on Corrosion of Excavated Wrought Iron Artifacts	1-14	<p>Corrosion of iron artifacts proceeds abruptly after excavation and causes serious damage in many cases. The corrosion rate is affected by environmental conditions and internal factors such as compositions, inclusions and structure of metal. The influence of chlorine and sulfur on corrosion of iron artifacts is discussed in this paper.</p> <p>Six wrought iron artifacts were investigated: four nails (7C, 18C), an iron arrowhead (6C) and a yariganna, a traditional Japanese planer (6C). The structure of corrosion products and the distribution of elements were measured by optical microscope, X-ray diffraction analyzer and scanning electron microscope with energy dispersive X-ray micro-analyzer.</p> <p>Chlorine was found locally in narrow bands on the remaining metal surface granular form on the surface of a spalling layer, both in magnetite matrix. However, since chlorine was not found in places rich in silicone, it appears that the presence of silicone affects the distribution of chlorine and inhibits iron corrosion by chlorine. Corrosion by sulfur was found in different forms, but all were surrounded by layers of iron oxide compound, suggesting corrosion by sulfide inclusions. Concentration of chlorine and that of sulfur were not found in the same area. It seems that when one factor causes corrosion, it inhibits the corrosion of iron by the other factor.</p>	iron artifacts, corrosion, chlorine, sulfur, magnetite	鉄製品, 腐食, 塩素, 硫黄, マグネタイト	
No.42	1998	OKADA, Fumio; AKIMOTO, Shigeo	Experimental Reproduction of Soybean Paste Described in Ancient Literature	15-25	<p>This paper deals with the reproduction of soybean paste which was used in ancient times to join sheets of washi (Japanese paper) to make a scroll. Although the method of producing soybean paste has already been lost, we attempted to reproduce soybean paste based on information found in ancient literature. As a result, we were able to make the following observations.</p> <ol style="list-style-type: none"> 1. By stewing soymilk until gelation, we obtained paste similar to what may well have been ancient soybean paste used to join sheets of washi. 2. This soybean paste tends to have greater tensile strength than other traditional kinds of paste. 3. This soybean paste shows a tendency to turn yellow more quickly than other traditional kinds of paste. 4. 200g of this soybean paste can be used to join over 1000 sheets of washi into a scroll, a result which corresponds with records found in Nara and Heian literature on soybean paste. 	paste, soybean paste, adhesive, washi	糊, 大豆糊, 接着剤, 和紙	
No.42	1998	KITANO, Nobuhiko; KOEZUKA, Takayasu	Some Experiments for the Production of Tetsu-tan Bengala Used in the Edo Period	26-34	<p>Synthetic bengala (red iron oxide: Fe_2O_3) was one of the most popular red pigments used in the Edo period. There were two different kinds of synthetic bengala at that time. One was roha bengala made from roha ($FeSO_4 \cdot 7H_2O$) and the other was tetsu-tan bengala made from iron scraps. Some old manuscripts indicated that the origin of tetsu-tan bengala was older than that of roha bengala and the quality of the former one was not so good. Thought the production techniques of tetsu-tan bengala is transmit just in the documents, we have not enough information about it. In this paper, we made some experiments in making tetsu-tan bengala, in order to understand its character and traditional production techniques. The results we obtained are as follows.</p> <ol style="list-style-type: none"> (1) Hematite (Fe_2O_3) could be produced from iron rusts, when roasting temperature was controlled about 650-700 °C. (2) Iron rusts did not color, but the sample containing chloride or sulfate about 3wt% was colored easily. (3) The red color of this bengala is not clear than that of roha bengala. (4) Tetsu-tan bengala in the Edo period could be made from iron rusts, containing chloride or sulfate (for example, sea water or spring water) added intentionally at the roasting process. Corrosion products shape like a continuous series of islands in magnetite matrix. The corrosion products which are considered as sulfide inclusion was surrounded by two layers of iron oxide compound. In addition, It was found that silicone affect the distribution of chlorine and inhibit the corrosion of iron. 	tetsu-tan bengala, roha bengala, iron scraps, iron rusts, roasting process	鉛丹ベンガラ, ローハベンガラ, 鉄屑, 鉄サビ, 加熱工程	

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No.42	1998	INABA, Masamitsu; MURAMOTO, Satoko; TSUCHIYA, Junko; MASUDA, Katsuhiko	The Prevention of Malachite Staining by Application of Alkaline Solution	35-40	Application of calcium carbonate or magnesium carbonate solutions on the back side of paper was tested for preservation of Japanese painting. Washi (Japanese paper) made of kozo (70%) and hemp (30%) fibres were used. Samples of washi were treated with dosa, a 2.5% alum and 1.5% animal glue sizing agent, or with animal glue and funori (A kind of adhesive made from the seaweed Endocladiaaceae) sizing agent and artificially aged at 80 ° C, 65% RH for up to five weeks. Samples showed accelerated paper deterioration in colour and degree of polymerization (DP). Several of the above samples were also treated with rokusho (malachite) pigment in an animal glue binding medium. The results of these samples demonstrated a synergetic effect on the deterioration of paper. Application of calcium carbonate or magnesium carbonate to the back side of the paper lowered the deterioration.	malachite staining, magnesium carbonate, calcium carbonate, Japanese paper, copper-containing pigment	緑青焼け, 炭酸マグネシウム, 炭酸カルシウム, 和紙, 銅顔料	
No.42	1998	MIURA, Sadatoshi; HAYAKAWA, Yasuhiro	Evaluation of the Safety of S-shaped Hangers for Paintings (2)	41-46	The authors evaluated the strength of S-shaped hangers for paintings in relation to their material. They also examined the strength of S-shaped hangers with stoppers which are attached to the rod to prevent paintings from popping out. The result showed that the strength of brass hangers changed by the ratio of zinc. There was not an apparent difference between steel hangers and stainless steel ones because the tensile strengths of both steel and stainless steel are greater than 1000 kgf. Since the strength of S-shaped hangers depends on the bending strength of the material rather than its tensile strength, hangers with a small bend were stronger than those with a large one. As S-shaped hangers with stoppers have a small bend and a straight rod, they showed strength exceeding 300 kgf even though two holes had been opened for the stoppers. The authors concluded that the material of hangers should be carefully checked before use because hangers always appear the same due to their being plated by nickel or zinc. They also concluded that S-shaped hangers with stoppers are safer against an earthquake than the ones without. But the additional labor required when removing paintings and the price should be considered when a curator wants to use it.	painting, earthquake, S-shaped steel hanger, strength, material	絵画, 地震, S環, 強度, 材質	
No.42	1998	MATSUDA, Takatsugu	Change of Methyl Bromide Gas Concentration after Fumigation in Storage Rooms	47-54	At Fukushima Museum, exhibition rooms and storage rooms are fumigated alternately in June, every year. For this purpose, the museum is closed for about one week. The process of fumigation consists of sealing, fumigation, exhaust of gas, verification of safety, and delivery of rooms after fumigation. The concentration of gas was measured periodically in these rooms after fumigation. In the exhibition rooms, gas was not detected after one day. But in storage rooms, high concentration of gas was measured after one day: 52 ppm in storage room no. 1, 18 ppm in No. 2, 36 ppm in no. 3, 32 ppm in no. 4, and 40 ppm in no. 6 in 1996. This phenomenon is assumed to have been caused by the releasing of fumigant gas from the constituent materials of the storage rooms and/or the cultural properties stored in these rooms. As this is very dangerous, I tried to remove the fumigant gas by operating the air conditioners equipped in these rooms for three hours every day. The concentration of gas was measured every other day before operating the air conditioners, and it was found that gas concentration decreased rapidly below 15 ppm from the fourth day to the sixth day. But methyl bromide gas was detected even after 46 days. It is clear that absorbed fumigant gas had been retained in the constituent materials of the storage rooms and/or the stored cultural properties for a very long time.	fumigation, ethylene oxide, methyl bromide, storage room, air conditioner	燻蒸, 酸化エチレン, 臭化メチル, 収蔵庫, 空調設備	
No.42	1998	FUJIWARA, Shizuo	A Note on the "Said" First Production of Gold in Mutsu in AD 749	55-65	The first production of gold in Japan is said to be the discovery of alluvial gold which has been presented to the Emperor by Kyofuku, the Governor of Mutsu, in AD749. The discovered gold is said to have been used for the gilding of the Great Buddha image of Todajji Temple. This note raises a question on the opinion held so far that the said gold is the natural alluvial gold. By studying the old Japanese literatures and the opinions of the earlier researchers, this note concludes that the gold used for gold plating of the Grand Buddha image of Todajji Temple has been provided not only by the natural alluvial gold but also by the chemically processed raw alluvial gold. The possibility of the use of imported gold is also referred to.	Todajji temple, gilding of Great Buddha, alluvial gold, gold after chemical processing of raw alluvial gold, knead, vermilion	東大寺, 大仏鍍金, 砂金, 鍍金, 鍊, 丹	

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No.43	1999	HAN, Migyeong; NAKAMOTO, Naokichi; OSAWA, Masumi; SAKURAI, Kiyohiko	Studies on the Repellent Effects of Medicinal Herbs Used in Preservation of Objects Made from Plant Fibers -Repellent Effects and Methods of Administration of Cloves and Cassia Barks on Dermestid Beetles-	1-11	<p>Protection of materials made from plant fibers against insects have been studied throughout the history of China, Korea and Japan. Repellent effects of the medicinal herbs, cloves and cassia barks on Dermestid beetles were investigated.</p> <p>The tested insects were the larvae of black carpet beetles and varied carpet beetles. Experiments were carried out by direct or indirect contact with the repellent in erlenmeyer flasks (capacity 600 ml), sample bottles (capacity 1.65l, height 28cm) and paulownia boxes (dimension 40 x 40 x 15 cm). The results are as follows:</p> <ol style="list-style-type: none"> 1. Cloves were split into buds and calyxes. Calyxes were more effective as a repellent than the buds. 2. Cloves were more effective when applied in powder form. 3. Effects of the wrapping materials were also tested. It was shown that polyethylene was highly effective, indicating high gas permeability. 4. Cloves were placed at 2 different positions in raw silk in sample bottles. Cloves inserted at the middle were more effective than those at the bottom. This suggests cloves should be put at the top of containers to guarantee a high concentration of aroma. 5. In the paulownia boxes the same results were obtained. That is, cloves must be put uniformly in the containers, and the amount of cloves depends strongly on the volume of cloths. Cloves at the top of the box were more effective. Furthermore, it was shown that varied carpet beetles were more affected than the black carpet beetles. 	clove, cassia bark, repellent effect, silk, Dermestid beetles	丁香, 桂皮, 防虫効果, 絹, カツオブシムシ	
No.43	1999	KIGAWA, Rika; MIYAZAWA, Yoshiko; KOIZUMI, Masako; SANO, Chie; MIURA, Sadatoshi; NOCHIDE, Hideaki; KIMURA, Hiroshi; TOMITA, Bunshiro	Evaluation of the Effects of Various Pest Controlling Reagents on Pigments and Metals: Effects of Pesticides, Fumigants, Carbon Dioxide and Nitrogen	12-21	<p>Effects of various pesticides and fumigants, including those recently developed for use on museum materials, on pigments and metals were visually inspected.</p> <p>Tested samples were;</p> <ol style="list-style-type: none"> 1) Eighteen kinds of pigments and dyes: azurite, malachite, red lead, vermilion, iron oxide red, yellow ochre, hematite, oyster shell white, white lead, massicot, kaolin, arsenic yellow, indigo, cochineal and some colored lead glass (Jwabeni, Iwamomo, Usukuchimurasaki and Kiroku). In Test 1, each pigment was directly tested as powder. In Test 2, pieces of Japanese paper painted with each pigment and glue were tested. 2) Eight kinds of metals: silver, copper, iron, zinc, lead, aluminium, bronze and brass. Carbon dioxide (60% volume) caused significant change in the color of red lead powder at high relative humidity, over 87% RH. Paraformaldehyde discolored red lead and massicot powder. Allyl isothiocyanate caused remarkable changes in the colors of many copper- or lead-origin powdery pigments. Clove oil darkened azurite and malachite powder, and caused brownish sticky surfaces on red lead and massicot powder. Samples of colored paper were less susceptible than those of powders. Vikane® caused visual changes on zinc and lead. Empenthrin with liquid carbon dioxide slightly changed copper, bronze and brass. Carbon dioxide (60% volume) caused change in lead at high relative humidity. Dichlorvos caused change in lead, and corrosion on iron. Clove oil caused sticky surfaces on lead, and discolored copper, bronze and brass. Allyl isothiocyanate discolored copper and bronze in spots. 	pesticides, repellents, fumigants, effects on materials, discoloration	防虫剤, 防霉剤, 燻蒸剤, 木質試験, 変色	

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No.43	1999	KOSETO, Emi; SANO, Chie; MIURA, Sadatoshi	Chemical Changes of Inorganic Pigments under the Influence of Formaldehyde	22-30	<p>Formaldehyde can be considered one of the indoor pollutants. For this reason, the authors did an experimental study by exposing eleven kinds of inorganic pigments to extreme high concentrations of formaldehyde under both light and dark conditions. The temperature was kept around 20° C and the RH around 80%. The compounds were identified using X-ray diffraction analysis (XRD) before and after the experiment. The pigments used are azurite, malachite, mica, shell white, orpiment, white lead, massicot, red lead, tourmaline, tiger's eye and smalt.</p> <p>After the experiment, discolorations were observed for red lead and massicot, while some chemical reaction products were identified for azurite, white lead, red lead and massicot.</p> <p>a. Discolorations: Whitening of red lead was observed in the sample which was kept in the light while whitening of massicot was observed in the samples from both the light and dark conditions. The sample kept in the light did turn dark before it also whitened like the sample kept in the dark.</p> <p>b. Chemical reaction products: Many different chemical reaction products were identified and some of the major components are mentioned here.</p> <p>From the result of the XRD, the authors deduced that the whitening of the pigments containing lead was caused by the change from massicot or red lead to hydrocerussite. The darkening of massicot was caused by the change from lead monoxide to lead dioxide. In the case of azurite, no discoloration but a chemical change was observed. The main component of azurite basic copper carbonate changed into copper acetate under the influence of formaldehyde. This means that an insoluble blue pigment changed into a water soluble one. This is very important information for conservation.</p>	formaldehyde, inorganic pigments, discoloration, X-ray diffraction analysis (XRD)	ホルムアルデヒド, 無機顔料, 変色, X線回折分析法	
No.43	1999	YOSHIDA, Kazunari; SAITO, Kyoko; INABA, Masamitsu	Colour and Strength Change in Dyed Kozo Paper by Wet-thermal Ageing	31-46	<p>Improving preservation condition of dyed Japanese paper, discoloration and deterioration of the physical properties of dyed kozo paper were studied. Pieces of kozo paper (soda ash cooked) were dyed with kihada, kariyasu, haze, fuyou, suou, indigo, cochineal and lac with or without mordants, such as wood ash, alum and iron acetate. The samples were aged at 80° C, 65% RH for up to twelve weeks. Many of the pieces of dyed kozo paper showed pH reduction in within two weeks during the twelve wet-thermal ageing period, then a little change at around pH 6 after all that. However, all the samples mordanted with iron acetate showed pH reduction during whole ageing period. These samples mordanted with iron acetate also showed larger discoloration and deterioration of the physical strength of paper than others. Alum did not cause larger decrement of pH, but lowered the physical strength than the untreated papers. The deterioration rate of lacdyed paper without mordant is higher than that of other dyed papers without mordant, due to the acidity of the lac-dyed papers. Alum retarded the pH reduction and deterioration of the physical strength of lac-dyed paper. Pieces of dyed kozo papers mordanted with ash or dyed ones without mordant showed similar changes.</p>	dyed paper, wet-thermal ageing, mordant, washi, Japanese paper, natural dye, strength, colour	染紙, 湿熱劣化, 媒染剤, 和紙, 天然染料, 強度, 色	
No.43	1999	ITO, Atsuko; SINKAI, Tetuo; SUGISITA, Ryuitiro	Study on Berensu (Prussian Blue) Deteriorating Silk Fibers of Edo-period Kosode	47-58	<p>Understanding the characteristics of textile materials and the causes of deterioration are essential for conservation purpose.</p> <p>It has been often reported that the blue pigments e.g. Prussian blue, attack silk fibers of Edo-period kosode, which is considered as the prototype of the present-day kimono.</p> <p>Edo-period kosode fragments dyed with berensu, a dialect name of Prussian blue from 18th century Japan, were analyzed using an energy dispersion X-ray microanalyzer and a Fourier transform infrared spectroscopy. As result, iron and potassium were detected by EDX and cyanide by FT-IR.</p> <p>Iron ions were extracted from all of berensu samples in the present study. It was clarified that Fe, K, S, and water-soluble blue moved with water on kosode samples. It was found that berensu used in Edo-period kosode adsorbed a lot of water-soluble impurities causing deterioration after insufficient washing with water.</p>	Edo-period kosode, Deteriorated silk fibers, Berensu, Prussian blue, Iron ion	江戸時代小袖, 劣化した絹, ベレンス, プルシアンブルー, 鉄イオン	

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No.43	1999	AKIYAMA, Junko; INABA, Masamitsu	The Effects of Potassium and Cobalt on Discoloration of Smalt in Oil Media: Part I	59-69	Smalt is a pigment consisting of ground blue potassium glass with cobalt as coloring agent. In Europe smalt was used from the 16th through the 18th centuries in many oil paintings. Even in its early use it was recognized that some smalt in paints had the tendency to discolor, but the mechanism of discoloration remained unknown. In the first study the authors investigated the changes of linseed oil with smalt or cobalt blue to better understand the deterioration mechanism caused by the interaction of these pigments with oil. Smalt and cobalt blue pigments were ground with linseed oil and then painted on glass slides. These samples were aged by dry heat treatment at 60° C for one month. Both smalt and cobalt blue showed nearly the same color shifts on L*a*b* formula due to the yellowing of linseed oil. However, cobalt blue remained blue, while smalt turned into a dull grayish-green. In the second study, mixture of smalt and that related compounds (potassium carbonate, cobalt oxide, cobalt blue pigment) with linseed oil were heated to 130° C for up to 48 hours intermittently. XRF analysis confirmed that potassium and cobalt ions migrated from the smalt particles into the linseed oil. Cobalt oxide accelerated the drying of the oil, while potassium carbonate slowed the drying. The changes of the number of double-bonds in the oils were confirmed by the iodine value. Visible spectra analysis showed that cobalt oxide and potassium carbonate brought about color changes of the oil. Oil with smalt had medium iodine value between that with cobalt oxide and potassium carbonate and showed the largest color changes to dark brown due to the interaction of both.	smalt, potassium, cobalt, discoloration, linseed oil	スマルト, カリウム, コバルト, 変色, 亜麻仁油	
No.43	1999	TSUCHIYA, Yuko; SANCHEZ-BARRIGA, Antonio; UTADA, Shinsuke	"The Purification of the Temple" Owned by the Church of San Gines in Madrid and Attributed to El Greco: Rediscovery of a Signature during the Cleaning Process	70-79	"The Purification of the Temple" canvas attributed to El Greco belongs to the Church of San Gines in Madrid. The painting corresponds to the painter's later period, between 1604 and 1614. In 1986, it was exhibited at the Tokyo National Museum of Western Art in Japan. The chromatic changes which the work's mastic resin varnish has undergone have been very accentuated. In order to prepare the painting for an exhibition which will travel to Greece and Italy, it has been necessary to eliminate the oxidized varnish. The cleaning process of the said canvas was thus carried out at the Spanish Historical Heritage Institute Instituto de Patrimonio Histórico Español - IPHE). During the cleaning process, a signature containing all the characteristic features of El Greco's later signatures was discovered.	"The Purification of the Temple", signature, cleaning process	『神殿の浄め』, 署名, 洗浄過程	
No.43	1999	TAKEDA, Akiko	Basic Study Concerning Conservation and Restoration of a Japanese Tomb in Hoi An, Vietnam	80-95	Hoi An, Vietnam, developed in the 15th century as a center for the East-West trade and was a prosperous international trading city in the 17th and 18th centuries. A destination for Japan's vermilion seal ship trade (licensed foreign trade), Hoi An acquired a Japanese quarter in the early 17th century. Until Japan closed itself to external trade with the implementation of national exclusion policies in 1635, Hoi An had deep ties to Japan, as Japanese tombs there suggest. Three such tombs survive to this day. The city of Hoi An asked the advice of the Institute of International Culturer of Showa Women's University concerning the conservation and restoration of one of those tombs built in 1647 for Tani Yajirobee. To develop a conservation and restoration plan, an on-site study was conducted by the institute in February, 1997. That study and scientific tests produced the following information: 1. The main part of the tomb is likely built entirely of plasterwork. 2. The surviving original portions of the tomb are the underground burial chamber and part of the above-ground portion of the tomb. All other parts have been damaged and restored, using the technology of the day each time damage occurred. 3. The CaCO ₃ content in the plaster in the main part of the tomb tends to be lower in the original parts of the tomb and higher among the restored or repaired parts. 4. Deterioration of the tomb is due to repeated submersion in rainy-season flooding and to the weathering characteristic of plasterwork.	Japanese tomb, conservation and restoration plan, basic study, plaster work, weathering	日本人墓, 保存修復計画, 基礎調査, 漆喰モルタル, 風化	

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No.43	1999	HAYAKAWA, Yasuhiro; MIURA, Sadatoshi; TAJIRI, Takashi	Investigation of the tarnish on the surface of Tensho-Oban by X-ray Fluorescence Spectrometry	96-105	Tensho-Oban, which is regarded as the biggest existing gold coin in the world, was mined by the orders of Toyotomi Hideyoshi in the late 16th century. The dark brown appearance was observed on the upper surface especially around the center of the Tensho-Oban during its exhibition at the Currency Museum of the Bank of Japan. The tarnish that appeared on the surface of the object was investigated nondestructively. In order to identify the tarnishing material, an optical microscope and X-ray fluorescence spectrometers (XRF) with focused X-ray beam and with a facility of elemental mapping were used. It was found by microscopic observation that powdery white material was distributed within a wide area consisted of brown material. As results of a surface analysis using XRF with fine beam, sulfur was detected besides gold, silver and copper which were the constituting elements of the object, and the contents of Ag and S at the brown part were higher than those at the gold part. Furthermore, an elemental mapping by XRF showed that Ag was concentrated at the convex parts of the surface where tarnish was observed. As these results show, it seems most probable that the tarnish was caused by the presence of Ag ₂ S on the surface of Tensho-Oban. Although the formation of Ag ₂ S was not confirmed from these investigation, tarnishing is still likely to be continuing if sulfur is supplied from the outer atmosphere.	gold coin, Au-Ag alloy, tarnish, X-ray Fluorescence Spectrometry, non-destructive analysis	金貨, 金-銀合金, 表面変色, 蛍光X線分析法, 非破壊分析	
No.43	1999	KITANO, Nobuhiko; FURIHATA, Junko; HARA, Yuuichi; NARUSE, Koji; HORIUCHI, Hideki; KOEZUKA, Takayasu	Production of Tetsu-tan Bengala Used in the Edo Period -Iron Objects that was excavated from the University of Tokyo, Hongo Campus Area Site-	106-119	Many raw materials and tools related with the production of tetsu-tan bengala were excavated from the Hongo campus of the University of Tokyo including three types of iron objects excavated. They are (1) iron scraps (sample (a)), (2) iron rust (sample (b)) and (3) red pigments of tetsu-tan bengala (sample (c)). All of these samples were found in many ceramic bottles of the same type. The excavation area was considered to have been a residential area of minor grade samurai families in the Edo Period (18-19 th centuries). Some experiments using excavated raw materials were done to reproduce tetsutan bengala production techniques of those days. The results obtained are as follows: 1. When iron rusts (sample (b)) which was estimated to be amorphous iron hydroxide was heated at about 400° C, hematite (Fe ₂ O ₃) began to form. It was found that the best temperature to produce good red color pigments was between 650~800° C. The product is called tetsu-tan bengala. 2. The procedure to make tetsu-tan bengala in those days may be assumed to have been as follows. At first, broken iron scraps were rusted in bottles with water. The rust was separated and heated to about 650~800° C. At the last stage, the red materials were concentrated in water. These results indicate that the minor grade samurai families were engaged in tetsu-tan bengala production as side-business in the Edo Period.	Tetsu-tan Bengala, iron scraps, iron rusts, ceramic bottles, minor grade samurai families	鉄丹ベンガラ, 鉄屑, 鉄サビ, 陶器製徳利, 下級武家	
No.43	1999	YAMASAKI, Kazuo	A Brief History of the Research and Conservation of Cultural Property in Japan and Future Problems -The Japan Society for the Conservation of Cultural Property and the IIC-	120-126	The origin of the present the Japan Society for the Conservation of Cultural Property dates back to 1933 when Seiichi TAKI, professor of the history of fine art of the University of Tokyo, organized a small group with several natural scientists, his colleagues of the same university, to discuss problems such as deterioration of pigments under light, pastes used for mounting and insect damages to sculptures. This small group survived almost 20 years during difficult times and the present Society was born in 1951. The activities of the Society members are briefly described. The main problem to be solved in future is the enactment of a Code of Ethics and Guidelines for Practice. In comparison, the history of IIC founded in 1950 is briefly described.	history, Horyuji temple, code of ethics, guidelines for conservation practice	歴史, 法隆寺, 倫理綱領, 保存修復実務の基準	
No.43	1999	MIURA, Sadatoshi	History of the Japan Society for the Conservation of Cultural Property	127				

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No.44	2000	YAMAZAKI, KLEPS, Akiko	Conservation of 15th Century Manuscript on Parchment: The Belles Heures de jean, Due de Berry –The Role of White Lead in the Flaking Problem of a Tempera Contents Miniature and the Treatment of the Problem with Gelatin Solution-	1-14	Flaking, powdering, and cracking of media present challenging treatments for conservators. Consolidation is an effective method for treating these types of problems. In the 15th century The Belles Heures de jean, Due de Berry was produced by the Limbourg brothers for the Duke of Berry. This parchment-based prayer book is one of the treasures in The Cloisters, the Metropolitan Museum of Art. This highly esteemed prayer book has always attracted the attention not only of the public but of researchers and scholars. Three years ago, the Museum decided to publish a facsimile of the prayer book. Before the book was to be photographed, a condition check revealed extensive flaking and powdering problems of the media. A project team for the treatment of the prayer book was organized by the Museum, consisting of the curatorial staff of the Department of Medieval Art and The Cloisters, the Paper Conservation Department and a manuscript specialist. The flaking problem was especially extensive in white painted areas. XRD (X-ray diffraction, nondestructive) analysis showed lead white present in the white areas and in areas mixed with white. The problem, probably caused by white lead, was treated by consolidation with a gelatin solution. An ultrasonic mister system was chosen for the application of the gelatin solution. The use of ultrasonic mister was first reported by Stefan Michalski and developed over the last 10 years. The mister delivers the consolidant as a fine mist with no harm to the object. Gelatin is a powerful consolidant even when diluted to 1% and minimizes the color changes when the solution is applied to the media as a mist. The flaking, powdering, and cracking problems of the prayer book have been successfully addressed using this method.	parchment, tempera, flaking, leadwhite, ultrasonic mister, gelatin	羊皮紙, テンペラ, 剥落, ウルトラソニックミスター, ゼラチン	
No.44	2000	ENDO, Miho; SINKAI, Tetuo; INABA, Masamitsu; SUGISITA, Ryuitiro	The Effect of Drying Oils and Diluents on the Drying Rate of Oil Paint Ground with Calcium Carbonate	15-28	The drying processes of linseed oil and poppy-seed oil, ground with calcium carbonate, were examined by measuring with gas chromatograph the amounts of fatty acid components. The effects of the diluents on paints with linseed oil were also studied. Diluents chosen were linseed oil, turpentine and mineral spirits. Additionally, this paper demonstrates the application of alkaline reagent for analysis of drying oil. The rates of decrease of linoleic and linolenic acids were directly related to the drying of the paint films. The rate of decrease of oleic acid became lower after those acids were depleted. When the paints were ground with an appropriate amount of oil and made into thin layers, there was no distinct difference among the three kinds of diluents in the rate of decrease of unsaturated fatty acids and that of increase of azelaic acid. When the paints were ground with excess oil and made into thick ones, they showed great differences. The most effective diluent for the paints were turpentine and then mineral spirits. Linseed oil as a diluent made a film on the paint surface, which inhibited drying of the whole paint layer and retarded the decrease rate of unsaturated fatty acids.	drying oil, diluent, fatty acid analysis, gas chromatography, calcium carbonate	乾性油, 希釈剤, 脂肪酸分析, ガスクロマトグラフ分析, 炭酸カルシウム	
No.44	2000	NAKAJIMA, Tetsutoshi; NONAKA, Takako; MAEKAWA, Zen'ichiro; SATO, Syoken	Computer-Aided Restoration of Textile from the Al-Tar Caves	29-40	Many valuable woolen fabrics dated between 300 BC and 300 AD were found during the excavation of the Al-Tar cave remains in Iraq. Based upon scientific research and the technology for dyed woven fabrics and fur products in present West Asia, it is possible to improve our knowledge of cultural history of the time. Although the Al-Tar caves are a valuable discovery from the point of view of cultural history, the condition of many of the surviving artifacts was poor due to high temperature, flood, etc. Among the objects excavated from the Al-Tar caves, dyed woven fabrics amounted to about 1,500. The investigation and reproduction of several dyed woven fabrics were previously undertaken by Nakajima and others. Until now, reproduction was done by skilled workers and involved a large amount of trial and error together with time and money. However, in this study, computer-aided reproduction technique was tested for an I-I-type woven relic (W-OH-368-13) taken during the excavation of the Al-Tar remains. It is a new attempt to introduce the digital technology of computer systems in order to decrease the number of working stages and required labor. In addition, based upon simulation results acquired from a study of materials and weaving methods, the reproduction of excavated woven fabrics was tested using a weaving machine controlled by a computer.	digitization, weaving simulation, 300 BC-300 AD, woolen fabric, Iraq	デジタル化, 織リシミュレーション, 紀元前後2~3世紀, 毛織物, イラク	

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No.44	2000	HASHIMOTO, Shusa; INOUE, Haruhisa; TAKEUJI, Hirokazu; KAMBA, Nobuyuki		41-51	In order to study methods of evaluating the air tightness properties of display cases for museums, air change rates were measured and discussed. A display case was filled with a concentration of carbon dioxide used as tracer gas, and air change rates were measured from the concentration decay. The result shows that a general air ventilation rule can be applied to the air changes in a display case and that the linear relationship between time and the logarithms of the carbon dioxide concentration decay holds good. The air change in a display case can be calculated by the inclination of the linear graphs and the inclination calculated from the initial and final values (two-points method) is roughly equivalent to the inclination obtained by regression analysis. However, the faster the fan installed in the display case moved, the more the air change rates increased and deviated from the general air ventilation rule. When a gap of 1 mm was made, in the upper part of the display case between the door glass and the body glass the air change rates increased drastically. It became clear that to improve the air tightness properties of the same type of display cases as there used in this experiment, the way to fit the door glass to the body required improvement. To further improve the air tightness of the display cases, the temperature differential between the inside and outside of the display case should be considered.	display case, air tightness evaluation, air change rate, carbon dioxide, concentration decay	展示ケース, 気密性評価, 自然換気回数, 炭酸ガス, 濃度減衰	
No.44	2000	KIGAWA, Rika; MIURA, Sadatoshi; YAMANO, Katsuji	Overview of the Present Alternative Methods of Methyl Bromide Fumigation for Controlling Pests in Museums	52-69	In confronting methyl bromide depletion according to the Montreal Protocol, a new framework for controlling pests in museums is necessary. The new framework based on Integrated Pest Management is overviewed. Various non-chemical methods including anoxia, carbon dioxide and low and high temperatures, and chemical methods are briefly explained with charts showing their usages. Also, effects of each method on human health are shown in tables.	pest control, methyl bromide	生物被害防除, 臭化メチル	
No.44	2000	KITANO, Nobuhiko; KOEZUKA, Takayasu	Fundamental Research on Sekio (Orpiment) Pigment Contained in Excavated Urushi Objects of the Edo Period (I)	70-79	This paper presents the results of fundamental research on sekio (orpiment) contained in urushi layer of objects of the Edo period. In order to study the characteristics of this pigment, we deciphered a series of manuscripts of the Edo period on sekio. The results we obtained are as follows. (1) From the Edo period to the present, there has been confusion about what name to use for different types of yellow pigments. On consulting some manuscripts, it seems that siou refers to sekio, yuou to keikanseki (realgar) and tou to gamboge. (2) It was discovered that there were two types of sekio - natural and synthetic. Natural sekio used in the early Edo period was made by grinding mineral orpiment. Synthetic sekio used from the mid- to late Edo period was made either by dry-heating of wet-refining processes. (3) Sekio was used in yellow-colored (mid- to late 17 th century) and green-colored urushi (mid-18 th to mid-19 th centuries).	orpiment, realgar, synthetic pigment sekio: king's yellow, indigo, arsenolite	石黄, 鶏冠石, 人造石黄, 植物藍, 亜砒酸	

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No.44	2000	KAMBA, Nobuyuki	Characteristic of Relative Humidity within a Small Space such as a Packing Case, a Storage Box and a Display Case	80-90	<p>A general review of some of the theories and methods proposed to control relative humidity within a packing case, a storage box and a display case are presented from both the historical and scientific points of views. VWhen a packing case is sealed against moisture diffusion and air exchange, the interior temperature and relative humidity are influenced by the ambient temperature. A rise in temperature causes a rise in relative humidity and vice versa. The ratio of the variation of relative humidity to the variation of temperature is about 0.4 in the packing case which contains cellulosic materials. When the ratio is maintained at nearly 0.4, the moisture content of the materials is kept constant, resulting in dimensional stability of the materials. The coefficient of heat transmission of a packing case decreases with increasing thickness of the crating materials and added thermal insulation, which stabilizes both interior temperature and relative humidity.</p> <p>The interior relative humidity of wooden boxes is influenced by the ambient relative humidity because of moisture diffusion and air convection. Wooden boxes regulate relative humidity variation effectively. It depends on the construction, thickness of the wood and ratio of interior surface area to the volume.</p> <p>The interior relative humidity of display cases is influenced by the ambient relative humidity. The main cause of relative humidity variations is air convection, related to the air exchange rate of the case. Relative humidity variation is controlled by better sealing and by introducing moisture buffering materials in the cases.</p>	relative humidity, temperature, packing case, storage box, display case, airtightness, air exchange rate, thermal insulation, wood, hygroscopic property, humidity buffer	相対湿度, 温度, 梱包ケース, 保存箱, 展示ケース, 気密性, 空気交換率, 断熱性, 木材, 吸放湿特性, 調湿剤	
No.45	2001	KASASAKU, Nana; SHIMODORI, Maiko; KOHMOTO, Kohtaro; SAITO, Masako	The Effect of Light Source and Relative Humidity on Discoloration of Fabric Dyed with Natural Dyes	1-11	<p>To evaluate the effect of light sources and relative humidity on discoloration of dyed fabric, exposure tests by three different fluorescent lamps under three different relative humidity conditions were performed. Twenty-four pieces of fabric dyed with natural colorants and mordants on silk or cotton which have been pre-treated differently were used. The three fluorescent lamps (Toshiba Lighting & Technology Corporation) are D65 daylight-simulator (D65), ordinary use white lamp (W) and Lamp for art galleries and museums (NU) which does not contain wavelength under 400 nm. The tests were performed under controlled temperature (23.5°C) and relative humidity (45, 56, 65%RH) for 350 hours. The color difference (ΔE) of each sample before and after the tests was calculated.</p> <p>Color fading was influenced mainly by colorants and mordants, not so much by the fiber materials and their treatments. Degree of color fading was almost the same at 45%RH and 56%RH, but greater at 65%RH under all lamps. The effect of light sources on color fading was larger than that of the relative humidity, and the color fading ratio was 1.89($\Delta E_{D65} / \Delta E_{NU}$) and 1.75 ($\Delta E_{W} / \Delta E_{NU}$) at 45%RH. It became clear that color fading would be prevented by about 43~47% by using NU lamp under 45%RH.</p>	fabric dyed with natural dyes, discoloration, light source, relative humidity	天然色素染色布, 変退色, 光源, 湿度	
No.45	2001	WAKUI, Maiko; YATAGAI, Mamiko; KOHARA, Natsuko; SANO, chie; IKUNO, Harumi; MAGOSHI, Yoshiko; SAITO, Masako	ICP-AES and X-ray Fluorescence Determinations of Mordants on Fabnc Dyed with Natural Dyes	12-26	<p>As a preliminary investigation to the study of deterioration and color fading behavior of textiles dyed with natural dyes as well as their mechanism, silk (raw and degummed) and cotton (grey-and-desized and scoured-and-bleached) either mordanted with Al or Fe or mordanted and dyed curcumin or hematoxylin were prepared. Also the amount of mordants on the samples was measured by ICP-AES and X-ray fluorescence analyses.</p> <p>The amount of Al and Fe on silk was two to three times more than that on cotton. The amount of mordants on raw silk was more than that on degummed silk; on the other hand, the amount of mordants on grey-and-desized and scoured-and-bleached cotton was almost the same. The amount of Fe was about one and a half times that of Al, but the differences between dyed samples and mordanted with sulfate, acetate and chloride were small. Equations to estimate the amount of Al and Fe on silk and cotton from fluorescent X-ray intensity measured with an X-ray fluorescence analysis are proposed.</p>	natural dyes, mordant, ICP-AES, X-ray fluorescence analysis	天然染料, 媒染剤ICP発光分析, 蛍光X線分析	

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No.45	2001	HAYASHI, Akiko; SAITO, Masako	Characterization of Red Natural Dyes on the Fabric by HPLC (I) –Cochmeal, Lac, Kermes and Madder–	27–43	Red natural dyes of cochineal, lac, kermes and madder were analyzed by HPLC with a photodiode array detector to obtain fundamental data for the identification of these red dyes on fabric. Pure colorants, dyestuffs and dyed fabric were used as samples. T_R and λ_{max} of the main colorants of dyestuffs and the extracts of fabric with different mordants gave the same chromatogram with those of their main colorants. T_R of carminic acid, laccaic acid and kermesic acid were 4, 7, 12 minutes and that of alizarin, purpurin, pseudopurpurin was 14~18 minutes, respectively. From these results, it became clear that it is possible to use this method to identify the red fabric dyed with these dyes.	textile, red natural dyes, characterization, HPLC	染織品, 赤色系天然染料, キャラクターゼーション, 高速液体クロマトグラフィー	
No.45	2001	HAYAKAWA, Yasuhiro; MIURA, Sadatoshi; OHNUKI, Mari	Investigation of the Surface Treatment for Coloring of Silver Coins Issued in the Edo Period	44–60	Silver coins issued in the Edo Period, which are composed of silver-copper alloy, have several levels of fineness ranging from 80 to 13.5wt.% of silver content. The color of silver-copper alloy varies with silver content and shows silver color only in the case of large silver content. Therefore, it has been thought that some kind of treatment was carried out on the surface of silver coins issued in the Edo Period to give greater appearance of silver. In order to characterize the surface structure of silver coins issued in the Edo Period, chemical composition and depth profile of the elements contained were investigated. X-ray fluorescence spectrometry was used to measure the chemical composition near the surface of one type of silver coin. Elemental mapping analysis was also done for the cut surface of the coin. It was obvious that silver content near the surface was larger than that at the center of the coin. The depth profile of elements near the surface of another type of silver coin was measured using scanning Auger electron microscopy in addition to scanning electron microscopy. Enrichment of silver and relative depletion of copper near the surface was revealed, and the thickness was found to be less than 10 μ m. It was also found by SEM observation that they have silver-copper eutectic alloy as a micro-structure. The existence of surface treatment for coloring silver coins issued in the Edo Period was confirmed by this investigation.	silver coin, Ag-Cu alloy, iroage; surface treatment for coloring, X-ray fluorescence spectroscopy, Auger electron spectroscopy	銀貨, 銀-銅合金, 色揚げ, 蛍光X線分析, オージェ電子分光分析	
No.45	2001	AKIYAMA, Junko; INABA, Masamitsu	The Effects of Potassium and Cobalt on Discolouration of Smalt in Oil Media (II) –The Progress of Discolouration and Chemical Changes–	61–72	Smalt causes serious discolouration in oil paintings. In our previous paper, we reported that cobalt and potassium in smalt affected discolouration synergistically and that oxidizing reaction of linseed oil was accelerated or inhibited. Linseed oil only (O) and with smalt (S), potassium carbonate (K), cobalt oxide (CO) or mixture of potassium carbonate and cobalt oxide were aged by dry heat treatment in air at 90°C, 110°C and 130°C. Discolouration and decrease of linoleic acid were measured continuously. When discolouration took place, absorption expanded to longer wavelength during heat. Only the rate of discolouration was different between the samples. The activation energies for decrease of linoleic acid were O: 67kJ/mol, S: 96kJ/mol, CO: 38kJ/mol, and K: 100kJ/mol. Since the increase of hydrogen oxide group matched with the decrease of linoleic acid, it is believed that part of the decrease of linoleic acid is due to oxidation reaction. The amount of conjugated diene was increased by heat treatment but showed small differences between samples. This result indicates that conjugated system extends even in the case of potassium-containing oil. It was made clear that not only oxidation reaction but also other reactions contributed to discolouration of oil with smalt.	smalt, discolouration, oxidation, potassium, cobalt	スマルト, 変色, 酸化, カリウム, コバルト	

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No.45	2001	KIGUARWA, Rika; MIYAZAWA, Yoshiko; YAMANO, Katsuji; MIURA, Sadatoshi; NOCHIDE, Hideaki; KIMURA, Hiroshi; TOMITA, Bunshiro	Practical Protocois of Low Oxygen Atmosphere and Carbon Dioxide Treatments for Eradication of Japanese Museum Insects	73-86	<p>Pest controlling strategies in Japan are now facing a period of great change, as the fumigant, methyl bromide, will be phased out by 2005. Among various alternatives, we have attempted to make practical protocols for low oxygen atmosphere and carbon dioxide treatments that are fit for situations in our country. The criteria for selecting these methods are their wide applicability to various kinds of materials and safety to humans. These methods would be effective alternatives for some cases, especially where the scale of infestation is small and limited and when long treatment is possible.</p> <p>We have attempted to make practical, semi-simple protocols of low oxygen and carbon dioxide treatments to facilitate practical eradication in cultural institutions in our country. Major Japanese insect pests were grouped into three based on their mortality data, and for each group, we set up treatment conditions to achieve 100% mortality, especially for cases where elevated temperature control (25°C or 30°C) is available. Experiments at ambient temperature (ca. 20°C) were also done to determine treatment periods in museum storages. As a result, we propose more than two months at 20°C as a safe period to achieve complete mortality for low oxygen treat-ment of the most tolerant group of our museum insects. Experiments were also done to examine treatment conditions for insects that tunnel deeply inside books and wooden objects. In the case of books, insects that tunnel deeply inside were eradicated at the same rate as insects on the surface of books. On the other hand, mortality of insects that tunnel deeply inside wooden objects varied with density, size as well as surface coating of the objects.</p>	low oxygen, anoxia, carbon dioxide, pest control	低酸素濃度処理, 二酸化炭素処理, 害虫防除	
No.45	2001	YOSHIDA, Kazunari; KATSUMATA Saito, Kyoko; INABA, Masamitsu	Colour and Strength Change m Dyed Koza Paper by Ultraviolet Induced Ageing	87-98	<p>To improve preservation condition of dyed Japanese paper, discolouration and deterioration of the physical properties of dyed kozo paper were studied. Pieces of kozo paper (soda ash cooked) were dyed with kihada, kariyasu, haze, fuyou, suou, indigo, cochineal and lac with or without mordants, such as wood ash, alum and iron acetate. In a previous paper, wet-thermal ageing was discussed, and in this report the effect of UV irradiation (fade-o-meter: carbon arc, black panel temperature 63 °C, 336 hours) on the same samples is discussed. PH of dyed paper decreased in the first 48 hours of UV irradiation, then remained constant around at 5.5 up to 336 hours except those dyed with indigo (about pH 7).</p> <p>Iron-acetate-mordanted samples did not show large pH reduction in this experiment, although it did by wet-thermal ageing. UV irradiation caused remarkable colour fading, especially on the mordanted samples. Kihada faded most in the first 48 hours, while the other dyes, such as lac, did so slowly but continuously till 336 hours. Tensile energy absorption increased once around 48 to 96 hours (of UV irradiation) and then decreased. The strength property of iron-acetate-mordanted samples decreased more rapidly than that with other mordants.</p>	dyed paper, mordant, natural dye, deterioration, ultraviolet light	染紙, 媒染剤, 天然染料, 劣化, 紫外線	

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No.45	2001	YAMANO, Katsuji; KIGAWA, Rika; MIURA, Sadatoshi	Prevention of Digger Wasp Damage on Wooden Sculptures and Structures at Todajji Temple with Vapor Strips of a Pyrethroid, Empenthorin	99-105	<p>Digger wasps (Hymenoptera: Sphecidae) made combs on various parts of Buddhist sculptures and structures at Hokkedo and Kaidando of Todajji Temple. It was feared that colored parts of sculptures and structures could be affected by the combs. Therefore, investigation of damage and effective controlling method was necessary.</p> <p>The combs turned out to have been originally made by Sceliphron madraspatanum kohli (Sickmann), and were used by Chalybion japonicum (Gribodo), as is frequently seen. Most of the combs were made at dark and narrow, hidden parts: for example, in mouths, hands and clothings of Buddhist sculptures. As most of their sculptures are Important Cultural Property of Japan and many people come to see them all the time, it was not appropriate to spray or paint strong pesticide directly on them. Nevertheless, a long-term controlling method as safe as possible to humans was desired.</p> <p>In this trial, we used vapor strips of a pyrethroid, Empenthorin, as a repellent to digger wasps. As a result, at Hokkedo, it was very effective in preventing activities of digger wasps. No new digger wasps have come into the structure and no new combs have been found in the observation period of 16 months, during which all the vapor strips of empenthorin were once exchanged to fresh ones 8 months after the start of the experiment. On the other hand, at Kaidando, one small new comb was found under the roof of a small structure at a point very far from the vapor strips.</p>	digger wasp, pyrethroid, Empenthorin, repellent	アナバチ類, ビレスロイド, エンベントリン, 忌避剤	
No.45	2001	NAKATANI, Akiko	Color Variation of Shakudo over Time Depending on Its Composition	106-117	<p>The copper-gold metal alloy shakudo is a material used in making traditional Japanese metal works. This material presents different color tones on its surface as a result of the amount of gold content in the copper. However it is not clearly recorded how different the color tones are. So, in order to study the relation between the chemical component of shakudo and its color tone as well as the effect of ageing on color change, the author made new test samples.</p> <p>Six test samples containing different amounts of gold were made according to the manufacturing process recorded in old literature. These samples also contained copper of two types: three of the samples with greater amounts of gold contained almost pure copper, while the next two samples contained copper with impurities (kuromido) and the last contained no gold but was made completely from kuromido. All six samples were left under normal environment in central Tokyo without light for 11 years. The hue, value and chroma of the test samples were measured.</p> <p>As a result of investigation, it was found that the change in value primarily caused the change in color of the samples and that the color difference among them became smaller over the course of time. It was also found that the hue of the sample with the greatest amount of gold did not change much with time, while that of the next two samples changed with time. This would suggest that the amount of gold affects the difference in color over time. However, results showed that the color of the fourth sample containing some amount of kuromido did not change as much over time as expected. The cause of this phenomenon may lie in the addition of kuromido, which is one of the manufacturing processes recorded in old literature.</p>	Shakudo, variation over time, color, Niirachakushoku, Kuromido	赤銅, 経年劣化, 色, 煮色着色, 黒味銅	

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No.45	2001	KITANO, Nobuhiko; KOEZUKA, Takayasu	Fundamental Research on Pigment Sekio Contained in Excavated Urushi Objects in the Edo Period (II)	118-127	<p>The authors have been studying the pigment sekio used for coloring of urushi objects in the Edo Period through observation. Studies of literature on the use of sekio in urushi objects revealed that this pigment may be classified into two types: that made from natural orpiment and that made by synthetic method. The former was made by crushing orpiment imported from south-east Asia and from China in the early 17th century (Edo Period) and was used in the yellow layer of urushi decoratives which is frequently seen in makie objects. The latter was produced from the latter half of the mid-Edo Period by mixing synthetically-made sekio and blue-colored particles and was sometimes used in green urushi objects.</p> <p>In this paper, we report the results of scientific investigation (X-ray diffraction analysis, microscopic examination and UV-spectrum analysis, etc.) of sekio used in urushi objects of the Edo Period while making reference to the use of sekio documented in literature of the past.</p> <p>The results of X-ray diffraction analysis show that sekio may be grouped into two types by the difference in the nature of the peaks. Sharp peaks from orpiment As_2S_3 was clearly observed in the yellow-colored urushi object while such peaks could not be seen so clearly in the green-colored urushi objects, suggesting that synthetically-made sekio does not contain fully-crystallized orpiment Arsenolite As_2O_3 and sulfur S, which are raw materials for synthesis, were also detected in the green-colored objects.</p>	green colored Urushi layer, indigo, As_2S_3 synthetic pigment sekio: king's yellow, As_2O_3 [Arsenolite], S [Sulfur]	緑色系漆, 植物藍, 人造石黄, 亜砒酸, 硫黄	
No.45	2001	MIURA, Sadatoshi	Anti-seismic Measures for Display and Storage	128-140	<p>Earthquake is one of the most important disasters to be considered in conservation in Japan. Since our country is located on a volcanic belt around the Pacific Ocean, we suffer much from earthquakes. Many museums, temples and shrines were destroyed by the Kobe Earthquake which occurred on 17 January, 1995. Cases of damage to cultural property were analyzed, and damage was divided into two types according to causes: damage directly caused by the earthquake and damage indirectly caused by the earthquake. The former included damage caused by movements (upsetting, slipping, falling and shaking) while the latter included that by water and fire.</p> <p>There are three types of seismic isolation systems: base isolation for a building, floor isolation for a specific floor and table isolation for a display case. In this report, focus will be placed first on table isolation system introduced for display and storage after the Kobe Earthquake. The table isolation system decreases horizontal acceleration to less than one tenth. Isolation from the ground is realized by using different devices: concave rails, concave plates, roller bearings with two eccentric circles, coil springs, friction dampers, viscous dampers and their complexes. In many seismic isolation devices which are commercially available, vertical isolation is not adopted because vertical isolation needs a coil spring, which makes the system complicated and thicker. Seismic isolation is very effective but should be used by considering some points: price (it is expensive), weight (it is heavy), space (it needs about 20cm space for its strokes of shaking) and maintenance.</p> <p>Another effective method for preventing damage by earthquakes is to improve already-employed devices. For example, since paintings slipped down from hangers distorted by the Kobe Earthquake, the safety of steel hangers of different S shapes and of thickness was also evaluated by testing their tensile strength. The result showed that the strength of hangers does not depend on the tensile strength of steel itself but on its bending strength. A straight-shaped S hanger was about six times stronger than a largely bent one. It is thought that a steel hanger of more than 5 mmφ with a straight-shaped S would have enough strength against an earthquake. Other anti-seismic measures such as an adhesive mat and wax are also discussed in this report.</p>	exhibition case, earthquake, anti-seismic, seismic isolation system, display tools	展示ケース, 地震, 耐震, 免振装置, 展示具	

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No.46	2002	NAKATANI, Akiko	Sensory Evaluation of Shakudo Over Time Contents Depending on Its Different Compositions	1-13	<p>This paper is a sequel to the report "Color Variation of Shakudo over Time Depending on Its Composition" in Bunkazai Hozon-Syuhoku Gakkaisi, volume 45. Six test samples examined in this report are the same as those of the previous study. These samples, having different ratios of gold, were made according to the manufacturing process recorded in old literature. The samples were kept under normal environment in the central part of Tokyo for 11 years. Color measurements of the samples were taken in the previous examination. Since sensory evaluation of color by human eye cannot be ignored in a comprehensive study of color, the sensory impressions of the tone of the samples under natural light were evaluated in the present study by 5 to 10 women in their 20s and 30s. The results were compared with measurements of hue, value and chroma taken in the previous examination.</p> <p>It was found that the differences in the sensory evaluation of shakudo containing gold and copper at a weight ratio of 5 to 100 (gobu-sashi shakudo) and other types of shakudo showed correlation with the differences in actual measurements. The values obtained by sensory evaluation of gobu-sashi shakudo and of shakudo containing gold, copper, and copper with impurities (kuromido) at a weight ratio of 0.5 to 50 to 50 (gorin-sashi shakudo) showed greater correlation than other shakudo samples and the difference became smaller after the passage of time. It had been said that it is possible to obtain a color similar to that of gobu-sashi shakudo by adding kuromido to shakudo containing little amount of gold, and the results of the present examination confirm this. It was also found that the more bluish the samples appeared, the greater was the preference, and measurements of gobu-sashi shakudo actually showed it to be strongly bluish, even with the passage of time. For these reasons, it may be surmised that gobu-sashi shakudo is most preferable. The results of the present study thus reveal that there is a strong correlation between sensory evaluation and actual measurement and that in the case of examination of samples having little color, as with metals, sensory evaluation is especially effective.</p>	shakudo, composition, color, variation over time, sensory evaluation	赤銅, 組成, 色, 経年変化, 官能評価	

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No.46	December, 2002	CHEN, Gang; KATSUMATA, Saito Kyoko; INABA, Masamitsu	Permanence of Traditional Chinese Paper –Changes in Physical Property by Accelerated Ageing–	14–25	Seven kinds of traditional Chinese paper for painting and calligraphy, such as Xuan paper, Daqian writing paper, Fuyangxuan paper and Wenzhou bast paper, were selected as samples to investigate their strength and durability after accelerated ageing (SO ₂ C, 65%RH) for up to 16 weeks. Changes in color, tensile energy absorption (TEA), folding endurance and tear strength of these samples were measured to evaluate their permanence. The effect of dosa (aqueous solution of 0.7wt% animal glue with 0.35% alum and its 3 times of concentration) as an acidic sizing agent was also studied. Compared with Fuyangxuan paper and Wenzhou bast paper, Xuan paper and Daqian writing paper have higher pH, and the rate of deterioration of their strength and discoloration was lower. After being sized with dosa, the deterioration rate of all these kinds of paper was accelerated. Xuan paper showed higher buffering capacity in pH to the acidic sizing agent.	Chinese paper, permanence, dosa, physical property, deterioration	中国紙, 保存性, ドウサ, 物理的性質, 劣化	
No.46	2002	NAKAJIMA, Tetsutoshi; SADO, Emiko; NONAKA, Takako; MAEKAWA, Zen'ichiro; HATTA, Seiji	Computer-Aided Restoration of Textile from the Al-Tar Caves (II) –Study on Comfort Properties of H-shape Pattern Woven Relics–	26–36	In general, it is difficult to directly touch historic textiles because they are often seriously damaged or are valuable as cultural property. However, to learn the life of ancient people, it is necessary to examine the textile that they actually used. Therefore, it becomes necessary to reproduce textiles very similar to the original, in order to satisfy the above two contradictory. This paper proposes a new procedure for examining the way in which ancient people used textiles for clothing in their life. H-shape pattern woven relics obtained during the excavation of the Al-Tar remains are discussed in this study. Hand and clothing properties of I-I-shape pattern woven textile that was reproduced with the aid of computer were measured in order to know how the ancient people feel comfort to the textile. These data were compared with those of similar textiles of today, then, as a result, it was found that the textile that was assumed as a cape had properties appropriate as an outer garment in a warm region.	reproduced textile, hand property, transport property	復元織物, 風合い特性, トランスポート特性	
No.46	2002	RO, Toshitami; ISHIGURO, Takeshi; TAKANO, Sayoko; JINNO, Shingo; SANO, Chie; ISHIZAKI, Takeshi	Study on Acid Gas Emission in the Museum Storage	37–47	During exhibition and storing in museums, presence of alkali and acid gas quite often have deteriorating effect on art object. In such a context, air contamination in the storage with alkali and acid gas poses a serious problem to the storing environment. In particular, carboxylic acid gases have the tendency to alter the corrosion of lead objects, and it is imperative to establish a method of controlling gas contamination in the storage. Therefore, in controlling such contamination, it is important first to identify the source of such contamination. Gas analysis of the air in the storage was carried out in the Yamanashi Prefectural Museum of Art and the source of emitting place of pollutants was studied in this paper. It is proved that out-gassing from interior materials constitutes an important source of such contamination. However, indoor acetic acid gases were shown to have been removed by chemical air filter installed in an air handling unit.	storage, air quality, air cleaning, acid gas	収蔵庫, 空気質, 空気清浄, 酸性ガス	
No.46	2002	WAKUI, Maiko; YAMAZAKI, Kazuki; SAITO, Masako	The Amounts of Mordants on Black and Red Fabric Dyed with Natural Dyes	48–57	The amounts of mordants (Fe, Al and Sn) on black and red colored silk fabrics dyed with natural dyes were measured by ICP-AES and X-ray fluorescence analysis. The amount of Fe on black silk fabrics dyed with several natural dyes differed depend on the dyes, but there were no differences between the fabric textures. Also the amount of Al on red silk fabrics dyed with cochineal, lac and madder differed depend on the dyes. The amount on madder was two to three times more than cochineal and lac. The severe color fading was admitted after washing treatment by SDS or LAS on silk fabrics dyed with cochineal with Sn, but there was no change in the amount of Sn between them. From these results, color fading was supposed to be caused by anionic ion of SDS and LAS, but not losing the amount of Sn on the fabric. The amount of Fe on black colored Kimono fabrics of Edo period showed a wide range of amount. The amount was large on the deteriorated fabrics.	black fabric, red fabric, amount of mordant, ICP-AES, X-ray fluorescence analysis	黒色染色布, 赤色染色布, 媒染材料, ICP発光分析, 蛍光X線分析	

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No.46	2002	OIKAWA, Tadashi; TEDUKA, Hitoshi; MATSUI, Toshiya; MATSUDA, Yasunori	The Air Environment of Storage Rooms with Interior Made of Western Redcedar, Thuja plicata, and The Influences of Its Volatiles on Materials of Cultural Property –Corrosion of Iron–	58–65	<p>It is important for museums to keep indoor air clean from the point of view of the preservation of cultural property. Recently, some acidic conditions in the air of storage rooms composed of wood wall have been reported. In Tohoku History Museum, once, some storage rooms with interior made of Western redcedar showed acidic. In order to clarify the cause of acidity, the air of the storage rooms in the Museum was analyzed by ion chromatography (IC) and gas chromatography–mass spectrometry (GC/MS). The results of IC measurement showed that there were very few differences between the acidic and the neutral storage rooms in the concentration of formic and acetic acid. By GC/MS measurement, hinokitiol and phenol were detected in the acidic storage rooms.</p> <p>On the other hand, hinokitiol and phenol in volatiles from pieces of Western red cedar in a closed test chamber were detected by GC/MS analysis. Iron chloride (III) solution is colored green–blue by compounds of tropolon group (such as hinokitiol) and phenol group. Also by this color reaction, the tropolon group compounds were detected. These experimental results suggest that volatiles from the wood, such as hinokitiol, may be the cause of acidification in the storage rooms.</p> <p>Iron test samples (SS400) were heavily corroded by high concentrated volatiles from the wood pieces in the chamber test, although this phenomenon has not been detected in the storage rooms after two years.</p>	Western redceda, hinokitiol, storage, analysis of indoor air volatiles, corrosion of metal	ベイスギ, ヒノキチオール, 収蔵庫, 空気成分分析, 金属腐食	
No.46	2002	NARUSE, Masakazu	Temperature and Relative Humidity Environment of the North Section of Shoso-in Repository	66–75	<p>Temperature and relative humidity environment in the Shoso-in repository has drawn the attention of various researchers interested in the conservation of cultural properties since the Edo period. Investigations with a self–recording thermo–hygrometer (using a bimetal strip and a bundle of human hair) were made between 1949 and 1959 by the Osaka District Meteorological Observatory. In the last few years we have used data loggers to record temperature and relative humidity in the north section of the repository and in a storage chest inside that section. This paper presents the results of measurements over a six–week and a one–year period in 1999 and 2000.</p> <p>At the daily amplitudes of variations, the average ratio of the temperature variations in the upper story of north section to the outdoors was 14/100 and that in the chest to the outdoors was 13/100, while the average ratios of variations in relative humidity to the outdoors were 20/ 100 and 3/ 100, respectively. At the annual amplitudes of variations, the ratio of the temperature variation in the upper story of north section to the outdoors was 77 / 100 and that in the chest to the outdoors was 76/ 100, while the ratios of variations in relative humidity to the outdoors were 60 / 100 and 25/ 100, respectively. The limited humidity variation inside the chest is due to the buffering properties of the wood used.</p>	Shoso-in, Azekura building, chest, temperature and humidity, humidity buffering effect	正倉院, 枝倉, 唐櫃, 温湿度, 調湿能力	

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No.46	2002	HIDAKA, Shingo; DATE, Hitomi; NOCHIDE, Hideaki; KIMURA, Hiroshi; KIGAWA, Rika; MIURA, Sadatoshi	Practical Examples of Carbon Dioxide Treatments for Eradication of Insect Pests in Folkloric Cultural Objects	76-95	<p>According to the Montreal Protocol, the museum use of methyl bromide will be phased out on January 2005 in Japan. As methyl bromide has been widely used for eradication of insect pests of cultural properties, alternative methods are in great demand. Folkloric cultural properties usually consist of various kinds of materials, and the major materials like wood, straw, bamboo, leather and fur are easily damaged by insects. Therefore, the eradication of insects is indispensable in the conservation of folkloric cultural properties. As folkloric cultural properties have variety in their forms and sizes, we usually perform large scale treatments for eradication. So, this time, we chose carbon dioxide treatment for an alternative method of conventional methyl bromide fumigation. This method is useful for large objects such as wooden boats, tools for agriculture and so on, which require a large sealed space.</p> <p>Four runs of experiments were carried out in order to make practical manuals of carbon dioxide treatment – a safety manual and a process controlling manual. We also tested the effects of carbon dioxide treatment on various kinds of materials. As a result, no significant damage was observed by our treatments, as long as treatments were performed under usual conditions. A safety standard of carbon dioxide concentration during treatment was set as under 1,000 ppm near the door way and 5,000 ppm near the sealed space. In our process controlling manual, we especially paid attention to carbon dioxide concentration during the first purge of the gas. It is necessary to maintain 60 to 80% volume carbon dioxide for two weeks at 25°C to make sure the mortality of insects pests. The authors set the concentration of carbon dioxide at the end of the first purge as 70 to 75% volume amount, where we did not have to do any additional purge during entire two weeks treatment.</p> <p>From our experiments here, we concluded that carbon dioxide treatment is quite useful for the eradication of insect pests in folkloric cultural properties. We hope that the results of this study would be a help to disseminate this method more widely.</p>	folkloric objects, ethnologic objects, carbon dioxide treatment, insect eradication	民俗資料, 二酸化炭素 処理, 殺虫処理	
No.46	2002	TSUKADA, Masahiko	Case Studies on Monitoring and Countermeasures for Indoor Air Pollution at the National Museum of Western Art, Tokyo	96-113	<p>This paper is a revised version of a report already made in the "Journal of the National Museum of Western Art", 2002.</p> <p>Indoor air pollution is a serious problem for the conservation of art works in modern museums. This paper presents three case studies concerning the monitoring of pollutant concentrations and countermeasures needed to reduce such concentrations, as carried out during construction work at the National Museum of Western Art, Tokyo. In each case, the materials used in construction work were studied, a sufficient seasoning period was set, rooms were ventilated at the maximum rate during the seasoning period, and the concentration of pollutants was monitored during the seasoning period. In one case, capacity problem with the air-conditioning system meant that the room's temperature and relative humidity were not adequately controlled during the summer. As a result, although sufficient seasoning period was set for the room, high levels of acetic acid was emitted. As a countermeasure, the room's relative humidity was lowered by the use of dehumidifiers, and the room was ventilated for a much longer period than originally scheduled. This experience reconfirmed the need for careful monitoring of pollutant concentrations.</p> <p>Six methods of monitoring pollutant concentrations were used in three cases. This paper evaluates them on the assumption that a curator in charge of the conservation of art works could utilize them on site. The combined usage of "pH Test Paper for Indoor Air/ Henshoku Shiken-shi" and detector tubes for passive sampling (passive dosimeter tubes) is an effective way to get a rough understanding of the situation in a fast, easy and economical manner on site. In case problems do arise, however it is best for curators to consult with specialists to make a more detailed examination of conditions.</p>	indoor air pollution, monitoring of pollutants	室内空気汚染, 汚染物 質モニタリング	

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No.46	2002	KUROSAKA, Itsuma	Architectural Planning of Museum for Protecting Art against Indoor Air Pollutants	114-122	<p>Many studies on indoor air pollution in museums have already been reported, but most of these works are scientific examinations and do not suggest possible solutions to the problem. Thus it is very important to consider how plans for museum storage may be made to protect art works against indoor air pollution.</p> <p>First, in order to lessen ammonia amount, it is advisable not to have unnecessary concrete structures such as pillars and beams in the room because gaseous ammonia is emitted from concrete. A large room has an advantage over a small room in keeping indoor air pollutants low because the ratio of the total volume of the room to the total surface area of the room relates to the concentration of air pollutants. It is also advisable to cover concrete walls in order to prevent the interior from direct dispersion of ammonia gas from concrete wall. Air flow is desirable between concrete body and the covering material in order to remove ammonia gas, but measures should be taken to avoid the mixing of polluted air with room air.</p> <p>Storage rooms should be positioned on the north or east side of the building because the amount of ammonia gas increases with the rise in temperature of the concrete. Amount of released ammonia increases also with the moisture content of concrete and this is why the building without the interior covering is not recommended especially in an extremely humid district. The highest floor and the lowest one are not recommended for planning storage because of high temperature and high humidity.</p> <p>It is recommended that a tall tree be planted on the south and west sides of the building to cut direct radiation of the sun. Planting is also useful in lessening the rise of temperature in the building by cutting the heat reflection outside the building. But it is not good to plan a pond or a spring next to the building because such a body of water tends to make concrete buildings humid.</p> <p>Treatments of concrete and use of mixing agents to concrete material are also useful, but it takes many studies to clarify the effects of these factors on art works which are constructed of many materials. The author thinks that comprehensive measures for improving indoor air quality in museums is most preferable.</p>	museum, preventive conservation, planning, ammonia gas, color difference	美術品保存施設, 保存計画, 設計, アンモニア, 色差	
No.46	2002	SANO, Chie	Indoor Air Pollution in Museum—Progress and Problems for Conservation—	123	Study on indoor air pollution was greatly progressed in these years. Author reviewed the progress and problems in this field.	air pollutant, indoor air quality	空気汚染物質, 室内空気質	
No.47	2003	TAKABAYASHI, Hiromi; KITADA, Masahiro; UTADA, Shinsuke	Spectrographic Study of Staining Techniques for the Identification of Binding Media in Oil Paintings	1-10	Staining technique to identify components in a binder used in oil paintings has been investigated spectrographically. Test samples for simulating white grounds of oil paintings with different ratio of linseed oil and rabbit-skin glue in the binder were fabricated. The samples were stained with Sudan Black B and Acid Fuchsine. Spectral reflectance and color difference of the samples before and after staining were measured. It was found that Sudan Black B selectively stains oil while Acid Fuchsine stains glue without regard to the binder with various compositions. Before and after staining with Acid Fuchsine, the color difference of the specimens containing only glue in the binding media increased more slowly than that of the binder containing both glue and oil. Reflectance spectra of the samples changed by ageing at 80°C in the air due to the deterioration of the binder.	staining technique, oil paintings, binding media, Sudan Black B, Acid Fuchsine	染色法, 油画, メディウム, スーダンブラックB, 酸性フクシン	

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No.47	2003	HAYAKAWA, Noriko; KAWANABE, Wataru	Comparison of "Aged Paste" (<i>furunori</i>) Produced Under the Various Conditions	11-20	"Aged paste" (<i>Furunori</i>) is a traditional material used as adhesive for the conservation of Japanese paintings. It is made by storing wheat starch paste in large jars and placing them in a cellar for as long as ten years. It has low viscosity and is a weaker adhesive than fresh starch paste. So it is used for the backings of scrolls except for the first backing. In Japan, each conservation studio for Japanese paintings prepares aged paste in its own way. Thus, there are some differences: for example in the starting material, in the number of years for storing and the place where it is stored and whether water is changed or not. This paper reports on our research of aged paste samples from 9 studios analyzed by using gel permeation chromatography (GPC) and X-ray diffraction (XRD). In GPC, pullulan was used as calibrating standard. fresh paste has over 1 million molecular weight while aged samples were divided into two groups: one with about 500 thousands molecular weight and the other with about 20-50 thousands molecular weight. The difference between the two groups is attributed to starting materials. The former type is produced by using dry wheat starch (<i>Kansojin</i>) and the latter by using wet wheat starch (<i>Namajin</i>). Lower molecular fraction was detected in some samples which are stored for less than 10 years or were taken from lower parts of the jar. All samples showed same XRD patterns, that is B type crystal of starch. It means that all samples are retrograduated.	aged paste, <i>Furunori</i> , GPC, XRD, molecular weight	古糊, ゲルろ過クロマトグラフィー, X線回析分析, 分子量	
No.47	2003	KOJIMA, Mariko; SAITO, Masako	Characterization of Red Natural Dyes by HPLC (II) --Safflower, <i>Suo</i> (<i>Caesalpinia sappan</i>) and Red Dyes on Two Textile Cultural Properties--	21-35	Red natural dyes have been used for textile dyeing for a long time. In our previous report, we presented the characterization of natural red dyes having anthraquinone structure (cochineal, lac, kermes and madder) by HPLC with a photodiode array detector. In this research, safflower - or <i>suo</i> (<i>Caesalpinia sappan</i>) - dyed samples, whose main colorants are different from the previous one, were analyzed by the same method. T_R of safflower yellow and carthamin (main colorants of safflower) were 5 and 15 minutes respectively and T_R of brazilin (main colorant of <i>suo</i>) was 6 minutes. Their λ_{max} were different from each other. From these results, it became clear that it was possible to identify these six red dyes. By using the same method of analysis, the dyes on two textile cultural properties (armor cord of Kushibiki-hachimangū, National Treasure, and akairo-dogi-uraji of Rin-noji, Important Cultural Property), were found to be madder (Japanese madder or Chinese madder) and safflower respectively.	red natural dyes, characterization, HPLC, safflower	赤色天然染料, キャラクターゼーション, 高速液体クロマトグラフィー, 紅花, 蘇芳	
No.47	2003	ISHIZAKI, Takeshi; TAKEDA, Kazuo; NOBORIO, Kouske	Study of Frost Deterioration of the Earthen Wall at the Historical Site of <i>Shiwa-jou</i>	36-49	Compacted-earthen walls for defense and administration surrounding the facilities of Shiwa-jou in a northern territory of ancient Japan were originally constructed in the early 9th century near Morioka, Japan. A replica of the walls was constructed in 1996 to conserve the cultural heritage. Since the temperature in the area reaches -16°C in winter, freezing and thawing cycles of water in the compacted soil have damaged the reconstructed wall. In order to clarify the process of frost deterioration field study was carried out by measuring microclimatic data, water content profile of the earthen wall and frost depth in winter. From the measurement of volumetric water content it was found that the water content in the lower part of the wall is higher than that in the higher part. This corresponded with the fact that the lower part of the earthen wall had deteriorated more than the higher part. From these observations it was recommended to take measures to prevent water infiltration into the earthen wall in order to reduce the speed of frost deterioration.	earthen wall, frost deterioration, freezing index, surface exfoliation	築地塼, 凍結劣化, 凍結指数, 表層剥離	

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No.47	2003	MABUCHI, Hajime; KATSUMATA, Saito Kyoko; NODA, Tetsuya; NAKABAYASHI, Tadayoshi; INABA Masamitsu	Mold Prevention Method for Paper during Polychrome Printmaking	50-64	<p>During polychrome printmaking, paper must be kept moistened for three to four days to stabilize its dimension. For this reason, it is easily attacked by molds. To prevent mold stain, artists add various fungicides into water for moistening. The aim of this study is to select preferable fungicides or antifungal agents which do not affect the print paper or the health of the artist.</p> <p>Air-borne fungi in a printing laboratory in Tokyo Geijutsu Daigaku were monitored from May to November 2001. The number of air-borne fungi increased in May, June and October. However, the number in June was not much larger than that in May because of the effect of air conditioning of the laboratory. This effect by air conditioning was confirmed by the measurement of temperature and humidity in the laboratory using a data loggers.</p> <p>Fungicides or antifungal agents were tested. They included formalin, sodium lauryl sulphate(SLS), thiabendazole (aqueous suspension type), sodium azide, alkaline and electrolytically ionized alkaline and acid water.</p> <p>Thiabendazole caused discolouration during moist heat ageing test (80°C, 65%RH, 10 weeks) of paper while SLS inhibited colour changes of paper.</p> <p>Only those fungi which were found in the air of the laboratory as well as in the paper with foxing used in the same room were selected.</p> <p>From the result of the antifungal effect, 0.25-0.5% of SLS aqueous solution is concluded as preferable. It is recommended that 0.5% of formalin be added to the SLS solution in order to extend antibacterial spectrum.</p>	print, mold prevention, formalin, TBZ, sodium lauryl sulphate	版画, 防カビ, ホルマリン, TBZ, ラウリル硫酸ナトリウム	
No.47	2003	KAMBA, Nobuyuki; TAKEI, Toshiyuki	Application of Fourier Transform Infrared Spectrometry for Non-destructive Study of Deterioration of Traditional Wooden Storage Boxes	65-70	<p>Deterioration of traditional wooden storage boxes has been studied by diffuse reflectance Fourier transform infrared spectrometry using fiber optics with diffuse reflectance probe (FODI). In the case of storage boxes made from Paulownia tomentosa wood, the spectra obtained from the inner surface portion were similar to the spectra of modern <i>P. tomentosa</i> wood. On the other hand, the spectra obtained from the outer surface portion differed from the one of modern <i>P. tomentosa</i> wood. The differences observed were as follows : The band at 1740 cm^{-1} was strong; the bands between 1900 cm^{-1} and 1550 cm^{-1} were broad; the bands at 1510 cm^{-1} and 1267cm^{-1} were weak.</p> <p>In the case of storage box made from <i>Cryptomeria japonica</i> wood, the results were the same as <i>P. tomentosa</i>. These results indicate that the components of wood didn't change in the inner surface portion of the box, but the lignin moiety was deteriorated in the outer surface portion of both traditional wooden boxes.</p> <p>It was said that FODI is a useful technique to study the condition of cultural property non-destructively.</p>	FT-IR, fiber optics, wood, <i>Paulownia tomentosa</i> , <i>Cryptomeria japonica</i>	フーリエ変換赤外分光, 光ファイバー, 木材, キリ, スギ	
No.47	2003	TAKEI, Toshiyuki; KAMBA, Nobuyuki	Non-destructive Analysis of Japanese paper by Fourier Transform Infrared Spectrometry	71-75	<p>Fourier transform infrared spectrometry (FT-IR) in transmittance mode was performed for the non-destructive analysis of Japanese paper. Satisfactory transmittance spectra was obtained from two or three samples of modern Japanese paper made from <i>Broussonetia</i> sp., <i>Edgeworthia chrysantha</i>, and <i>Diplompha</i> sp. The infrared absorption ratios of 1427cm^{-1} to 894cm^{-1}, which indicate cellulose crystallinity, were 3.5, 2.1, and 2.0 on <i>Broussonetia</i> sp., <i>Edgeworthia chrysantha</i>, and <i>Diplompha</i> sp. respectively. Next, the spectra were measured from old Japanese paper made between the 15th-20th centuries. It was indicated that the spectra and infrared absorption ratios of 1427cm^{-1} to 894cm^{-1} of the old Japanese paper were similar to those of modern Japanese paper. It may be said that FT-IR measurement on transmittance mode was an effective technique to study the features of papers without destructive sampling.</p>	FT-IR, Japanese paper, cellulose, crystallinity	フーリエ変換赤外分光, 和紙, セルロース, 結晶化度	

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No.47	2003	KIGAWA, Rika; NAGAYA, Natsuko; SONODA, Naoko HIDAKA, Shingo; Tom, STRANG	A Review on Integrated Pest Management in Museums and Related Institutions: Basic Concepts and Practical Steps for Introduction	76-102	<p>Integrated Pest Management (IPM) is now a crucial procedure for pest control in museums and related institutions worldwide. Many inquiries have come to the National Research Institute for Cultural Properties, Tokyo from institutions in Japan requesting more information on IPM and practical steps for its introduction. The main purpose of this review is to discuss the fundamental concepts of IPM for a better understanding of its strategy and flow, and then to describe the basic, critical and practical steps for implementing IPM in museums and related institutions in Japan.</p> <p>First, we review the origin of the idea and concepts of IPM, citing literature from the field of agriculture. Though agriculture and conservation of cultural property seem to be different in many aspects, their objectives with IPM are quite similar.</p> <p>Secondly, although there is excellent literature worldwide describing a systematic IPM approach for cultural institutions, little is available in Japanese. Therefore, we have tried to review the points of a systematic framework in IPM to facilitate introduction of IPM in museums and related institutions in Japan.</p> <p>Finally, some examples of institutions with a high regard for IPM are described to illustrate its practical application. One example is the Aichi Prefectural Museum of Art in Japan, while the other two examples are from abroad, the American Museum of Natural History in New York and the Cultural Resources Center of the National Museum of the American Indian in Washington, DC.</p>	IPM, museums, libraries, preventive conservation	IPM, 博物館, 美術館, 図書館, プリベンティブコンサベーション	
No.47	2003	MABUCHI, Hajime; KIGAWA, Rika; SANO, Chie	A Review on the Effects of Fumigants, Pesticides and Fungicides Used for Museums on Human Health	103-118	<p>When chemicals are applied to cultural properties, safety to human health should be considered prior to all other factors. This paper aims at reviewing the effects of fumigants, pesticides and fungicides which have been used for cultural objects on human health.</p> <p>Following information is provided in this paper: effects on human health including values of exposure limits, acute and chronic health effects, carcinogenic effects and reproductive effects; trade names; related laws; comments.</p> <p>All of the chemicals listed will not necessarily be appropriate for future use, but we have tried to list most of the chemicals that have been used for cultural objects in the past as well as those possibly used in future. It is hoped that these data might be used by museum staff when selecting appropriate chemicals.</p>	fumigants, pesticides, fungicides	燻蒸剤, 殺虫剤, 防霉剤	

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No.48	2004	NOCHIDE, Hideaki; KIMURA, Hiroshi; MIYACHI, Hiroyuki; KIGAWA, Rika; DATE, Hitomi; HIDAKA, Shingo	Examination of Various Conditions for Carbon Dioxide Treatment to Eradication of Museum Insects	1-15	<p>For about 30 years, fumigation with methyl bromide or bromide/ethylene oxide mixed gas has been widely performed as a powerful and effective pest control measure for Japanese cultural properties. But now, pest control strategy in Japanese museums is being changed from methyl bromide fumigation to a more integrated method because methyl bromide will be phased out at the end of 2004 according to the Montreal Protocol. One of the promising alternative methods adaptable to comparatively large objects like folk cultural properties is carbon dioxide treatment.</p> <p>Carbon dioxide treatment has wide applicability to various kinds of materials and is less toxic to humans than conventional fumigants. On the other hand, it requires long treatment period and high concentration (60 to 80 vol %) for effective treatment. In this paper, various factors that influence effects of carbon dioxide treatment are discussed. Tests were first done to examine the mortality data of various Japanese insect species. As a result it was found that some Japanese insect species are tolerant to high concentration of carbon dioxide (over 80 vol%). Tolerance seems to be related with oxygen concentration remaining in the atmosphere. It was also found that temperature plays a part in the effectiveness of this treatment. When temperature was raised from 15°C to 40°C, some species increased tolerance to carbon dioxide treatment under 15°C while all tested species decreased tolerance at over 35°C. When temperature changed during treatment, the effect of the treatment seemed to be similar to the effect at average temperature.</p> <p>Thus, although there are some factors that must be controlled in order to achieve the same effect with carbon dioxide treatment as was acquired by methyl bromide treatment, carbon dioxide treatment is a promising alternative method since it is less toxic to humans and the environment.</p>	carbon dioxide treatment, insect eradication, pest control	二酸化炭素処理, 殺虫処理, 防虫防除	
No.48	2004	HAYAKAWA, Noriko; ARAKI, Tominori; KAINUMA, Satoshi; TAGURO, Tokuchichi; KAWANOBE, Wataru	Characterization of Funari Extracted from the Red Seaweed as a Restoration Material	16-32	<p>Funari is one of the traditional restoration materials in Japan, used as an adhesive agent and as a consolidant. Funari is the generic name that includes three kinds of red seaweed, <i>Gloiopeltis tenax</i> (Ma-funari), <i>Gloiopeltis furucata</i> (Jukura-funari), <i>Gloiopeltis complanata</i> (Hana-funari). For the restoration of Japanese paintings, sheet-like Funari that is dried and bleached by sunlight is used. Restorers prepare their own Funari solution in their studios own sense and experience.</p> <p>Funari solution shows different characters depending on the temperature during which they were extracted. In this report, we characterize the Funari solutions which were prepared at room temperature and by heating. The solution which was prepared at room temperature had smaller molecular weight and low viscosity, while the solution which was prepared by heating had higher molecular weight and high viscosity. The result of centrifugation showed further precipitates in the solution prepared by heating than the other solution. Despite these differences, the adhesive force of Funari prepared at room temperature was higher than that of Funari prepared by heating. Since the purposes of using Funari in restoration vary, it is necessary to select a suitable way of preparing Funari solution.</p>	<i>Funari</i> , preparing condition, viscosity, molecular weight, adhesive force	フノリ, 調整条件, 粘度, 分子量, 接着力	

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No.48	2004	LEE, Nanhee; MASUMURA, Kiichiro; FRANK, Minney	A Study of a Koryo Dynasty Black Lacquer Sutra Box with decorated with Mother of Pearl Inlay – A Study of Manufacturing Techniques by the Construction of a Replica Box –	33-48	Approximately 20 pieces of Koryo-dynasty (918~1392) shell inlaid lacquerware survive to the present day. This paper is the result of an examination of a sutra box in the collection of the Tokyo National Museum. The box is decorated with stylized chrysanthemum designs similar to those used on the inlaid porcelains of the Koryo-dynasty. The style of the inlay is characteristic of the designs used in about the 12 th century. The wood grain pattern revealed by X-radiographs suggests that the wood used in construction was pine. The box is reinforced with Nunogise over the exterior surface. The results of shell cutting experiments indicated that the shell inlays were cut with a knife. The shell used seems to be ear shell (<i>Haliotis</i> sp such as <i>tschatkana</i>). It is thick at 0.2mm. Turtleshell uses to form small square shapes and parts of the flower stamens. These are backed with vermilion pigment which enhances the colour of the turtleshell. In addition to shell inlays two types of metal inlays are used and details of their analysis given in the main text. There are single lines made from pewter and twisted double wires made from brass. Decorated brass plates are fixed to the front, back and sides of the box, and one of the side plates covers an inscription which reads Kou Ni (黄二), which means the second sutra box having yellow letter (黄) in Senzimon (千字文). Experimentation suggests that the Shitaji (foundation layers) are made from a mixture of powdered cow bone mixed with Urushi. The elegant design and high level of technical skill employed in the manufacture of this box are indicative of the high level of development of shell inlaid lacquerware produced during the Koryo-dynasty.	mother of pearl inlay decoration of koryo, sutra box for containing buddhist scriptures, koryo dynasty, construction of replica	高麗螺鈿, 経箱, 高麗王朝, 復元模造制作	
No.48	2004	NIIYAMA, Sakae; WATANABE, Kenji; KIRINO, Fumiyo;shi; KITADA, Masahiro	Analysis of an Old Chinese Painting "Qingling" Owned by Bunka Women's University	49-58	Support material, underlayer material and paints of an old Chinese painting "Qingling" drawn during Yuan Dynasty (owned by Bunka Women's University) were investigated. The following results were obtained. First, support material is cotton, assumed to be Indian printed cotton based on its waving pattern and designs. Second, the underlayer material between support and paints is mainly CaCO ₃ . Third, blue paint and black paint are not crystal materials but amorphous materials such as organic dye. Fourth, the red paint is HgS (vermilion).	Chinese painting, sarasa cloth, underlayer material, paints	中国絵画, 更紗布, 下地材料, 絵具	
No.48	2004	HIDAKA, Shingo; SUGAI, Hiroko	Research for the Technique of Makie (gold craft lacquer) and Japanese Lacquer for Exterior Decoration of "Onna-Norimono"	59-74	Research was made of 26 onna-norimono (palanquins for Japanese feudal ladies) in museum collections in Japan. Analysis of their lacquer element by X-ray fluorescent spectrometry revealed that two kinds of traditional lacquer techniques had been used, namely hiramakie and keshifunmakie, rather than togidashimakie which is a more complex makie technique. Observation of the cross section of lacquer flakes also showed that nikawa foundation, which is simpler to make than lacquer foundation, and Japanese paper, rather than cloth, had been used. Since the techniques used to make onna-norimono are simpler and requires less time than would normal techniques of makie and Japanese lacquer, it may be said that they were approprichosen in the manufacture of onna-norimono which had to be made, often within a limited time, before the wedding of a Japanese feudal lady.	Onna-norimono, Palanquin, X-ray fluorescence analysis, lacquer, Edo period	女乗物, 篤籠, 蛍光X線分析, 漆, 江戸時代	

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No.48	2004	SAKATA, Satoko	Mitsuda-e Scroll Roller Ends (Mitsudajiku): An Investigation into Production Techniques	75-87	<p>Mitsuda-e is a decorative painting technique made with a mixture of mitsuda abura (mitsuda oil) and colored pigments. Mitsuda abura is made by combining drying oil, such as tung oil (<i>Aleurites cordata</i>; Japanese, <i>kiriabura</i>) or perilla oil (<i>Perilla ocymoides</i>; J., <i>enoabura</i>), with lead oxide (PbO; J., <i>mitsudaso</i>) or a similar additive to serve as a desiccator. When this mixture is used as a painting medium, it is known as mitsuda-e; scroll roller ends decorated with this technique are known as mitsuda jiku.</p> <p>One characteristic of the mitsuda-e technique is that, while creating the same luster as lacquer (J., <i>urushi</i>), it allows for decor in a wide variety of vivid colors, most notably white, which cannot be rendered in lacquer. The technique is seen primarily in decorative arts of the Nara period (710-794). Mitsuda jiku roller ends from this period include those decorated with white and those decorated with red oil pigments. Today, the mitsuda-e technique is nearly extinct, and little is known about the technical details of its production. So conservators typically replace mitsuda jiku with lacquered roller ends or other substitutes. In consideration of the dating, techniques, processes, and materials of the objects being conserved, however, there are cases in which it would be more appropriate to reproduce the original mitsuda-e technique.</p> <p>This article seeks to elucidate how the production methods of mitsuda jiku can be applied to the conservation of cultural properties. The author made mitsuda abura, color sample boards, and rollers based on documentary sources. The observation of actual art objects allowed her to create reproductions similar to extant examples and to gain increased information about the making of mitsuda abura, the coloration of the scroll roller ends, and other factors. Through this process, she was able to investigate the possibilities for reproducing the mitsuda-e technique.</p> <p>The conservation of Japanese paintings requires a detailed understanding of a variety of decorative arts, one of which is the technique of mitsuda-e. In this article, the author discusses the decorative art technique of mitsudajiku from the perspective of a cultural properties conservator specializing in painting and calligraphy mount-ing.</p>	drying oil, lead oxide, lead white, Minium, <i>Caesalpina sappan</i>	乾性油, 密陀僧, 鉛白, 鉛丹, 蘇芳	
No.48	2004	KITAGAWA, Miho	Two Types of English Japanning	88-97	<p>The term "japan" is still not clearly understood by many Japanese, even though there are recent academic reports describing the process of japanning. There are two basic types of varnish for japanning developed in Britain, namely "spirit varnishes" and "oil varnishes". The former type, "spirit varnish", is based on resins such as shellac or on a range of several other clear resins which were dissolved in alcohols distilled from wine. This type was very popular between the 17th century and the mid-18th century and many recipes were introduced in technical books not only for the artists but also beginners.</p> <p>The second type, "oil varnish", is based on a linseed oil medium and was used on a metal or paper base (<i>papier mache</i>), which was then baked. These japanned goods were produced industrially from the 18th century to the late 19th century. Though japanning is no longer used industrially in Britain, materials of the former are kept alive by restorers specialising in both Western and Oriental lacquerwork. This report describes the history of japanning in Britain and the original recipes used there; it also covers the present state of conservation of japanned work.</p>	japanning, spirit varnish, oil varnish, <i>papier mache</i> , <i>urushi</i>	ジャパニング, スピリット・ヴァーニッシュ, オイル・ヴァーニッシュ, パピエ・マッシュ, 漆	
No.48	2004	KIGAWA, Rika; MABUCHI, Hajime; SANO, Chie	Control of Molds in Museum Environments: Basic Strategie	98-113	<p>Molds are one of the often seen microorganisms on cultural properties, in both indoor and outdoor environments. Other microorganisms such as bacteria or algae also damage cultural objects, but they are less seen in indoor environments, as these groups need sufficient water to flourish. Recently there has been a great demand for a compact reference material in Japanese which describes measures to control molds in museum environments, since fumigants that have been used conventionally in Japan are facing draw backs these days. Information provided here addresses issues faced by staff in museums such as prevention, control measures and precautions for safety to human in handling molds.</p>	molds, cultural property	カビ, 文化財	

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No.48	2004	KIGAWA, Rika	A Review on Characteristics of Biological Agents and Affected Materials of Cultural Properties	114-124	Cultural properties include a wide variety of materials, organic and inorganic, and for each category, a broad spectrum of materials is included. Moreover, the storage conditions of properties varies from good indoor conditions to outdoor environments in severe climates. Therefore, the biological agents that affect cultural properties also include a considerable wide range of creatures. But when we look at each material, there is causal relationship that exists between biological agents and ingredients of the material. In this paper, the relationship between materials and characteristics of biological agents that affect the materials are overviewed, thus facilitating understanding of the reasons for the existence of biological agents and the mechanisms of damage they would cause.	cultural properties, biodeterioration	文化財, 生物劣化	
No.48	2004	YAMASAKI, Kazuo	A Brief History of The Japan Society for the Conservation of Cultural Property	125-131	1998年6月本会の第20回大会で、実質上1948年に発足して以来50年になるのを記念して本会の足跡と展望について特別講演を行った。今回は1933年の本会の前身の誕生70年を記念して再び「文化財保存修復学会の今昔」と題して講演することとなった。しかって内容が一部重複することをお断りする。また文中前をすべて着略した。	History, Horyuji temple, conservation of murals, copying of murals, fire disaster of murals	歴史, 法隆寺, 壁画保存, 壁画模写, 壁画火災	
No.48	2004	MIURA, Sadatoshi	Seventy Years of the Japan Society for the Conservation of Cultural Property	132-143	As the former association of the Japan Society for the Conservation of Cultural Property was founded in 1933, the year 2003 was its 70 th anniversary. The author reviews the history of the association which he divides into four periods: the first (1933-1947), the second (1947-1975), the third (1975- 1995) and the fourth (1995-present). In the first period "Kobijyutu-hozon-kyougikai" (the association of Japanese antiques) was founded on July 18, 1933 at the Faculty of Science in the University of Tokyo. Many professors of the University, including those in science and art history, joined the association at that time. In the second period the name of the association changed to Association of Scientific Research of Antiques. The first volume of Scientific Papers on Japanese Antiques and Art Crafts ("Kobunkazai-nokagaku") was published in 1951. Since the association was limited to professors and researchers, the number of members was only 37 in 1950. In the third period the name of the association changed again to Association of Scientific Research on Historic and Artistic Works of Japan. Due to the increase in the number of members, an annual meeting began to be held every year from 1979 and News Letters have been published periodically from 1982. At the beginning of the fourth period, the Kobe Earthquake occurred on January 17, 1995. The association worked with other institutions to rescue cultural property. This experience gave much influence to the activities of the present Society which started on June 4, 1995. The activities now cover wide field, from the publication of an academic journal, "Bunkazai Hozon-Syuhuku Gakkaisi" (Journal of the Society), to open lectures for the public in order to fulfill various interests of the present members which total about 1,000.	history, Association of Scientific Research of Antiques, Association of Scientific Research on Historic and Artistic Works of Japan, the Japan Society for the Conservation of Cultural Property	歴史, 古文化財資料自然科学研究会, 古文化財科学研究会, 文化財保存修復学会	
No.48	2004		A Round-table Talk "Seventy Years of JSCCP and its Future"	144-160				
No.49	2005	MATSUI, Toshiya; ICHIKAWA, Saori; MATSUDA, Yasunori	Distinction of the raw materials (shells and limestone) for calcium carbonate based on the shape of their particles	1-12	Investigation into raw materials and the making process of calcium carbonate used for pigments, lime plaster and wall paintings bases for is important for conservation and restoration of cultural properties. Shells and Limestone are known as raw materials for calcium carbonate. Especially with shells, the use of Ruditapes (asari), Crassostea (iwagaki) and Meretrix (hamaguri) is frequently mentioned in literature. It is difficult to distinguish each shell with TG-DT A curve. All shells have exothermic reaction above 950°C. After slaking and carbonation, the main constituent of all shells change to calcite, although they have aragonite and calcite before calcination. Limestone and shells used for calcium carbonate were discriminated by observing their shape with optical microscope and scanning electron microscope. Each crushed shell has a unique shape and show different shape from that of limestone. After calcination, the shape of limestone and shells retain the crushed shape with porous structure on the surface. The size of the vacancies of limestone is extremely smaller than that of shells. Although slaked and carbonated limestone retains its shape, the shape of shells is fragile and becomes powdery. The results indicate that the distinction of shells and limestone is possible by the shape of their particles.	calcium carbonate, shell lime, lime, calcination, remain	炭酸カルシウム, 貝灰, 石灰, か焼, 形骸	

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No.49	2005	SAKUMA, Michiko; UTADA, Shinsuke; KIJIMA, Takayasu	Two whites used in the works of the artists at Tokyo Fine Art School in the Meiji era: Techniques brought back from France by Kuroda Seiki	13-24	<p>It seems to the author that Kuroda Seiki, who was the first professor of the Department of Western Painting at Tokyo Fine Arts School (Tokyo Bijutsu Gakko), and his colleagues and students often used two whites deliberately in their works. Those two whites were white lead and zinc white. The former was the only white that artists satisfactorily used as an oil paint till the early 19th century; the latter was a new type of white, the major improvement of which occurred mainly in France at that period.</p> <p>As a result of investigation into literature on related issues in the 19th century, it seems safe to conclude that the way of using the two whites came from academic painting techniques. Before zinc white appeared, a parallel distinction between different types of white leads was found in academic painting techniques, in which artists chose ordinary white lead for "ebaucher" and silver white for "finir." Silver white and zinc white have many common features; both of them are pure white, expensive, very light and made up of fine particles but of less body and inferior in opacity. As a result, both of them are good for the finish. So it is plausible that zinc white replaced silver white.</p> <p>One of the books that mention such a usage of zinc white is J. G. Vibert's <i>La science de la peinture</i>. It may be worthy to remark that <i>Yogatebikigusa</i> [Ogai Mori et al. (eds.)] published in 1898, which was formerly believed to be a translation of Roupp's book in German though it does not contain any specific explanation of various pigments, has a very similar description about zinc white to that of Vibert's book.</p> <p>The rest of the paper is devoted to the examination of oil painting works of Raphael Collin, Kuroda, Rinsaku Akamatsu, and Hiromitsu Nakazawa.</p>	Zinc white, White lead, Techniques of oil painting in the 19th century, Seiki Kuroda, Raphael Colin	亜鉛華, 鉛白, 19世紀 油画技法, 黒田清輝, ラファエル・コラン	
No.49	2005	KOMATSU, Miki; NISHIOKA, Fumio; SAITO, Masako	Identification of red dyes and mordants used in 12th to 19th centuries Japanese armor	25-40	<p>Yoroi armor refers to a set of battle wear, developed in the Heian period (794-1185). Yoroi armor was laced with braids in colorful and beautiful designs. Some roi armor was dedicated to shrines and preserved for generations. It is important know about the colors and dyeing techniques used in armor braids to understand he yoroi armor. Such knowledge also helps when preserving and restoring historically important textiles.</p> <p>In this research red dyes and mordants on Japanese yoroi armor braids and red woolen cloths of jimbaori surcoat made during the 12th-19th centuries were identified by HPLC and X-ray fluorescence spectroscopy. From the results of dye analysis, Japanese or Chinese madder was detected from braids (samples A, B, C, D, E, G and) made during the Heian to Muromachi periods (12-16 C). Safflower and kihada mur cork tree, <i>Phellodendron amurense</i>) were detected in braids (samples I, J and) made later on. These results imply that the kind of red dyes used on armor raids changed from madder to safflower during the 14th-15th centuries. Lac and ive synthetic dyes were detected in the red woolen cloths of samples L-1 and L-2 respectively. From the synthetic dyes detected, it is clear that sample L-2 was restored later than 1884. From the results of X-ray fluorescence spectroscopy, Al and Fe were detected on the braids dyed with madder. It was concluded that Al was used as mordant but the origin of Fe could not be determined.</p>	Armor braid, Red dye, HPLC, X-ray fluorescence spectroscopy, Mordant	甲冑成糸, 赤色染料, 高速液体クロマトグラ フィー, 蛍光X線分析, 媒染剤	

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No.49	2005	ISHII, Mie; NAGASAKI, Iwao; ITO, Noriyuki; SAITO, Masako	HPLC analysis of natural yellow dyes and the identification of yellow and green dyes in Edo period kosode (kimono)	41-58	Yellow dyes used in Japanese Edo period (1603-1868) kosode (kimono) were analyzed by photodiode array high-performance liquid chromatography (PDA-HPLC). Dye manuals of the period were consulted and four yellow dyes were noted: ukon (turmeric, <i>Curcuma longa</i> L.), kuchinashi (<i>Gardenia fruit</i> , <i>Gardenia jasminoides</i> L.), kihada (amur cork tree, <i>Phellodendron amurense</i> L.) and kariyasu (<i>eulalia</i> , <i>Jliscanthus tinctorius</i> L.). For the purpose of identifying the dyes used in kosode, first color-compound standards, dyes, and fabrics dyed with known dyes were analyzed. Then the dyes of 7 kosode fragments with yellow and green ground and embroidery threads were analyzed. The elements (mordant) were analyzed by X-ray fluorescence spectrometer (XRF). One yellow dye was identified as kihada, containing berberine, without a mordant; three yellow dyes were ukon, containing curcumin, with alum. All the green dyes were kariyasu, containing luteolin, with alum and indigo; all the yellow dyes for embroidery threads were kihada without a mordant and all the green dyes for embroidery threads were kihada and indigo without a mordant. The dyes of the kosode fragments matched those described in manuals with the exception of kuchinashi which was not identified. Referencing historical documents when identifying dyes can aid both scientific analysis and interpretation of dyes used in historic textiles.	Yellow dye, HPLC, X-ray fluorescence spectroscopy, kosode	黄色染料, 高速液体クロマトグラフィー, 蛍光X線分析, 小袖	
No.49	2005	TAKEDA, Akiko; AKANUMA, Hideo; TSUCHIYA, Nobutaka	Manufacturing method of lacquer ware excavated from the Owari estate based on the analysis of the technique for making the foundation	59-74	A large number of artifacts and tools related to the production of lacquer ware were found in a ditch at the site of an Owari estate located in Ichigaya, Shinjuku, Tokyo, Japan. The lacquer ware dates from the end of the 18th century to the beginning of the 19th century. Two lacquer ware pieces were selected and then crosssectioned and examined by natural scientific methods. As a result of the examination, it became clear that one piece was restored and that its inner coating was coated by lacquer containing a large amount of iron oxide (believed to be hematite). Before restoring the artifact, it was covered with a lacquer film containing a lot of mercury sulfide (believed to be cinnabar). Similar results were observed on the other piece. The analysis revealed that the thickness of the foundation layers of the two objects was twenty to thirty times as thick as that of the lacquer layers. There was also a high possibility that the foundation layers of the objects contained volcanic ash. Although it is generally believed that there was no use of volcanic ash in foundation layers, this research showed that there was a high possibility of ash having been used. It was also discovered that one object had a thin layer that contain many minute As-S based compounds in the foundation layer. These results indicate that there is a high possibility that materials used were carefully chosen in order to give sufficient thickness to the foundation layer. A detailed investigation about the technique for making the foundation of lacquer ware in the 18th century and the 19th century had not been conducted until now. Important information has been obtained from this research. By continuing this research, it will be possible to gain a better understanding of lacquer ware manufacturing techniques at the end of the 18th century and the beginning of the 19th century.	Edo period, Owari clan, Lacquer ware, technique for making the foundation, Volcanic ash	江戸時代, 尾張藩, 漆器, 下地塗装技法, 火山灰	
No.49	2005	LIM, Sung, jin; KITADA, Masahiro; KIRINO, Fumiyooshi	Compositions and microstructures of Copper Mirrors fabricated in the late Edo era	75-85	Compositions and metallurgical microstructures of copper mirrors fabricated in the late Edo era were investigated. Compositions of the copper mirrors were analyzed by inductively coupled plasma atomic emission spectrometry (ICP-AES). Their compositions can be classified into three groups: Cu-Pb-Sb, Cu-Pb-Sn, and Cu-As-Pb alloy. Microstructures of the copper mirrors were observed by metallurgical optical microscope, scanning type electron microscope (SEM) and X-ray diffract meter (XRD). Microstructures of Cu-Pb-Sb alloy show three phases: α phase of Cu, eutectic phase of Cu-Cu ₃ Sb, and a non-solid solution of Pb with Cu. With Cu-As-Pb alloy, microstructures are: a phase of Cu, eutectic phase of Cu-Cu ₃ As and aPb phase. With Cu-Pb-Sn alloy, microstructures are: of a phase of Cu, an intermetallic compound of Cu-Cu ₅₆ Sn and α Pb phase. These results of microstructure observation and X-ray diffraction measurement show that these copper mirrors were fabricated by quenching from liquid phase.	Mirror, Edo-era, Quenching, Microstructure, Composition	鏡, 江戸時代, 急冷, 金属組織, 組成	

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No.49	2005	FUTAGAMI, Yoko; TSUMURA, Hiro'omi	Measurement and assessment of a cultural and historical building by using digital photogrammetry	86-99	For the measurement of a cultural and historical building, generally outdated hand measuring and new-style 3D laser range scanner measuring are adopted for archiving information of its structural or configurational characters. But these methods have some problems, such as measurement precision, quantitative assessment and so on. It is believed that a wide-application of 3D photogrammetric techniques is a substitute for. By using multi-dimensional photogrammetric camera, the 3-dimensional coordinates of a cultural and historical building shapes can be computed from plural focus positions. First, many pictures of the object were taken, search was made for many points in common between them, and each focus point was calculated or simulated in the computerized virtual space. Next, the distances from camera to focus points were calculated severally, and the deformation of lens were revised theoretically and mathematically. Finally, by using many pairs of stereophonic pictures, the many spaces without values were interpolated manually or half-automatically. As a result, from these methods, the information of structural or configurational characters could be extracted both in quality and in quantity. Moreover, 3D-fluctuation values of the collapsing brick wall became clear from the examination of the 3D-configuration data, and the collapsing model of brick wall could be constructed from these results.	Digital photogrammetry, Wat mahathat, Deterioration, Spatial analysis, Quantitation	デジタル写真測量, マハタート寺院, 劣化, 空間分析, 定量化	
No.49	2005	INABA, Masamitsu; TAKAGI, Akiko; YAMAGUCHI, Kana; KIRINO, Fumiyoshi; KIBE, Toru	Insertion-accelerated ageing test of paper: Effects of pressure and relative humidity on discolouration	100-107	Increased discolouration of acidic paper which was directly interfaced with alkaline paper was found on two natural ageing examples. However, the discolouration was inhibited at stitched area in the acidic paper. For the purpose of studying this difference of discolouration, acidic paper inserted into an alkaline booklet was pressured from 0 to 0.6 IViPa (0 to 15 kgf/25cm ²) and moist heat aged (80°C, 40-95%RH) up to 56 days. Larger discolouration of acidic paper occurred with increase of relative humidity for up to 80%RH. On the other hand, in the case of 95%RH with pressure, Ca ion, which was transferred from alkaline paper to acidic paper, neutralized acidic paper and lowered discolouration. Increase of distance with increase of the number of sheets of polyester film, which has several slits, on both side of acidic paper in the alkaline book decreased discolouration of both acidic paper and alkaline paper, but discoloration of both parts kept higher values than those aged under film. From this result it is clear that parts of materials which cause discolouration of paper are volatile.	Discolouration, Acidic paper, Alkaline paper, Insertion method, Natural ageing	変色, 酸性紙, アルカリ性紙, 挿入法, 自然劣化	
No.49	2005	YAMADA, Hironobu	Condition after conservation treatment of Oita-Motomachi rock-cliff sculpture and Iwaya-ji rock-cliff sculpture	108-117	There are many rock-cliff sculptures in Oita prefecture. They were carved from the 11th to the 17th centuries. Conservation treatment of these sculptures have so far been performed little by little. In the conservation treatment of Oita-Motomachi rock-cliff sculpture, a tunnel was dug behind the surface of the wall, and a pipe was laid underground for drainage. Resin was applied to the surface of the wall which had deteriorated, and hardening measures were taken. After the conservation treatment, degradation is progressing on the shoulder, the sleeve and the knee of the Yakushi-nyorai statue. Iwaya-ji rock-cliff sculpture had dried, the surface of the wall had separated in degradation, and a part of it had become depressed greatly. For conservation treatment many small holes were made on the surface of the wall which had become greatly depressed and resin were infiltrated little by little from there to harden the surface. Then, the holes were filled up with resin mixed with the soil which had exfoliated from the surface of the wall. Resin was sprinkled with a spray into the portion where the surface of the wall had separated and hardened. Observation of the condition after conservation treatment shows resin the film which had been sprayed for hardening has become separated from the wall. Observation also shows advancing external degradation. This is an unexpected result, given the resin used and method of conservation treatment. Some measures must be taken in the future to obtain better results.	rock-cliff sculpture, conservation treatment, progress observation	磨崖仏, 保存処理, 経過観察	

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No.49	2005	SANO, Chie; KIGAWA, Rika; AOKI, Shigeo; INUZUKA, Masahide; ISHIZAKI, Takeshi; MIURA, Sadatoshi	Carbon dioxide treatment and anoxia treatment for insect eradication of accessories of Amitabha of Houou-dou, Byodo-in, Kyoto	118-131	<p>Sedentary image of Amitabha and its accessories National Treasure of Houou-dou, Byodo-in, are under restration. In the course of restoration, eradication of insects was necessary as there were signs of insect attacks on some objects. Previous restoration works were undertaken about a century ago, and after that there was no record of the use of chemicals such as gaseous fumigants on the Amitabha and its accessories. This time, also, Non-chemical methods such as controlled atmosphere, were preferred if it was possible. So anoxia treatment and carbon dioxide treatment were planned in this case.</p> <p>Treatments had to be conducted in the building where the restoration works were undertaken. Considering the space, electric capacity, noise level of treatments and safety to staff, anoxia treatment with oxygen scavenger RP system K-type was performed for a small object. gachirin (a moon wheel, symbolizing realization in esoteric Buddhism) which was coated with white pigments, for three weeks at a temperature around 30°C. The laeger objects, such as the lotus pedestal and doubleringed nimbus of Amitabha, were treated with carbon dioxide separately in tents for two weeks at a temperature of above 25°C.</p> <p>All the treatments were successfully conducted, and insect mortality was certified with test insects, <i>Shitophilus zeamais</i>.</p>	Carbone Dioxide Treatment, Anoxia Treatment, Restoration Work, Treatment for Insect Eradication, Wooden Sculpture	二酸化炭素処理, 低酸素濃度処理, 修理, 害虫処理, 木彫像	
No.49	2005	KIGAWA, Rika; STRANG, Tom	Levels of IPM control: models for matching conditions to performance and effort	132-144	<p>The basic concepts and strategies of IPM for museums are well described in recent literature and a basic management flow is rationalized as five stages of control (Avoid, Block, Detect, Respond and Recover) for those who are involved in object preservation work. Yet there are many questions from real world situations with different institutional backgrounds, differing qualities of building features, numbers of people who can be involved in the activity, budget levels, etc.</p> <p>To help people see how IPM programs can be applied, this paper presents some models matching real situations and elements of IPM programs. For this purpose, a progressive series is envisioned ranging from outside a building to inside a perfectly sealed container within a modern building. Details are arranged to roughly match effectiveness with cost and effort. Readers can estimate first which level is closest to their own situation and use the progression as a prototype for designing their IPM strategies.</p>	Integrated Pest Management, Conservation of Cultural Properties	IPM, 文化財保存	
No.49	2005	MIZUKAMI, Kayoko	Comparison of traditional and synthetic paper for stenciling	145-154	<p>Japanese stenciling has a long history among the dye and weaving crafts of Japan. There is a wide range of techniques in order to create various masterpieces. Katajigami (traditionally prepared paper for stencil) is one of the vital elements in creating the beauty of Eclo-lwmon Katajigami is made by using either namajigami or muroiri techniques. In namajigami, paper is processed with persimmon tannin and stored for more than 3 years, while in muroiri, it is processed in the same way with tannin and then smoked. To achieve absolute subtleness. Katajigami for stencil is made from several sheets of washi paper laminated with persimmon tannin, which shows higher water resistance. However, the production of lwtajigami is decreasing, and synthetic paper made of wood pulp, synthetic artificial fibers and polyethylene film arc taking its place. By comparing the physical properties of traditional stencil paper and synthetic paper, the author discussed the differences between them and proves the superiority of lwtajigami (namajigami and muroiri) fabricated with traditional techniques.</p>	Dyeing, Stencil paper, Japanese paper, Persimmon tannin	染色, 型地紙, 和紙, 柿渋	

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No.50	2006	MASUDA, Katsuhiko	Recent Development in Paper Conservation in Japan	1-10	<p>Since World War II, individual historical documents have been restored mainly by traditional methods but grouped documents of huge amount started to be treated by newly developed methods whose idea is mass and preventive conservation.</p> <p>This paper describes the history of Japanese paper conservation, recent situations of libraries, archives and museum collections as well as the activities of laboratory staff studying to improve techniques and materials for their work. Changes are found in improved precision of work, techniques, materials and tools even for conservation of historical documents. Some new comers to paper conservation are not trained in traditional laboratories but work mainly for mass and preventive conservation.</p>	Paper consevation, History, Development	紙文化財修復, 歴史, 発展	
No.50	2006	FUJIMOTO, Seiichi	Application of Synthetic Resins for the Conservation of Sculptures: Focusing on the Work at the Bijutsu-in Restoration Studio	11-27	<p>With the establishment of the Ancient Shrines and Temples Preservation Act in 1897, the protection of cultural heritage (buildings and works of fine and applied arts) began to be undertaken by the government. This was then followed by the execution of their conservation.</p> <p>Conservation of sculptures was started under NIIRO Chunosuke of Nihon Bijutsu-in, which was established in 1898, and has continued for a little over 100 years. Although traditional techniques and restoration materials have been used mainly for the conservation of sculptures, synthetic resins have also begun to be used since 1949.</p> <p>With the advancement of conservation science, possibilities have developed for the conservation of cultural properties with the use of scientific methods in addition to traditional techniques. In this paper, by studying examples of conservation work done at Bijutsu-in, the author discusses the history of the application of synthetic resins for the conservation of sculptures.</p>	conservation, Buddhist image, wooden sculpture, synthetic resin, Bijutsu-in restoration studio	文化財修理, 仏像, 木造彫刻, 合成樹脂, 美術院国宝修理所	

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No.50	2006	MASUZAWA, Fumitake	History of Conservation Conservation Treatment of Excavated Wooden, Iron and Copper Objects and Folk Cultural Properties	28-52	<p>A great number of wooden and metal objects have been excavated since the 1960s due to investigation accompanying development. Left untreated, the color of these wooden objects became darker and cracks and distortions appeared as a result of shrinkage of wood while progress of corrosion led to the destruction of metal objects. On the other hand, folk cultural properties began to be manufactured not by skilled workers as had been done previously but in factories, causing a decline in traditional manufacturing skills. Conservation techniques employed until then could no longer respond to the needs for the preservation of these objects and new scientific measures (conservation treatment) were sought.</p> <p>The history of conservation treatment of excavated objects began with redox polymerization of wooden objects using acrylamide in 1961. This was followed by freeze-drying method, impregnation of PEG1540 and others, and still further, in the 1970s, by freeze-drying method using butanol and the introduction of impregnation of PEG4000 in Denmark as well as the improvement and use of alcohol-ether resin in Switzerland. Then, in the 1990s impregnation of lower molecular weight compounds such as higher alcohol, sugar alcohol and fatty acid ester was developed, and the time required to execute conservation treatment was shortened from one-half to one-third of what was previously required.</p> <p>For the conservation of metal objects, reduced pressure impregnation method using aqueous or non-aqueous acrylic emulsion was developed in the latter half of the 1960s. The removal of chloride ions, which are considered to cause the greatest problems from the point of view of the conservation of metal objects, with the exception of those on objects excavated from the sea, could not be solved until the 1980s. On the other hand, stabilization using benzotriazol was undertaken for copper objects in addition to resin impregnation. Yet the issue of chloride ions still remains an important problem.</p> <p>As for folk cultural properties, conservation treatment at first consisted of dismantling and reassembling of objects followed by dechlorination and resin impregnation. But later traditional techniques began to be introduced as necessary in an attempt to minimize damage due to dismantling and reassembling. Furthermore, since folk cultural properties are made of all types of materials, conservation methods appropriate for each material have been and continue to be developed.</p>	history, conservation treatment, waterlogged wooden object, excavated metal object, folk cultural property	歴史, 保存処置, 出土木器, 出土金属器, 民俗文化財	

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No.50	2006	MIURA, Sadatoshi	Development of Non-invasive Imaging Examination	53-74	Techniques for non-invasive examination such as X-ray radiography and IR reflectography are reviewed. In Japan an examination of art objects by X-ray radiography and IR photography was intensely conducted at first by a research team of the Tokyo National Research Institute of Cultural Properties in the 1950's. Since the team published a famous book, Research of Antiques by Optical Methods, in 1955, the techniques of examination are popularly called "optical methods" in Japanese. The examination, however, now uses various kinds of methods, not only an optical one but also an ultrasonic one for an ultrasonic computed tomography, for example. The author thinks that the examination by "optical methods" should be interpreted widely as one by non-invasive imaging. In this report he reviews the development of radiography and IR reflectography mainly after the 1960's. The radiography includes gamma-ray radiography, X-ray radiography, zero-radiography, digital radiography, X-ray computed tomography, neutron radiography, electron emission radiography (emissigraphie), electron transmission radiography and autoradiography.	optical method, X-ray radiography, X-ray computed tomography, digital radiography, electron emission radiography, IR reflectography	光学的方法, X線透過写真, X線CT, デジタルラジオグラフィ, エミシオグラフィ, 赤外線リフレクトグラフィ	
No.50	2006	SAWADA, Masaaki	History of Education in the Field of Conservation Science for Cultural Properties	75-84	In Japan, there are 22 universities that have departments or offer courses related to cultural properties. Almost always in these universities, lectures are given in conservation and many of the students attend them. This means that the majority of people associated with cultural properties have knowledge concerning conservation in one way or another. TENSIN Okakura, the art critic of the Meiji period, was once the principal of the Tokyo Fine Arts School and the director of the Imperial Museum and head of its Department of Fine Arts. It may be said that his achievements in "art education" and "conservation" of art objects led to today's education related to cultural properties and training in restoration. In this paper, the author examines the actual situations surrounding the education of conservation at universities throughout Japan.	conservation, science, OKAKURA Tenshin, Curriculum, Golden pavilion of the Horyuji temple	保存科学, 岡倉天心, カリキュラム, 法隆寺金堂	
No.50	2006	UTADA, Shinsuke; KOYANO, Masako; YAMARYO, Mari; SAKUMA, Michiko	Fifty Years of the Conservation and Restoration of Oil Paintings in Japan: Some Earliest Recollections	85-99	UTADA Shinsuke, KOYANO Masako and YAMARYO Mari belong to the first generation of people engaged in the systematic conservation of oil paintings in Japan, which consists of investigation, restoration and documentation. All being students of the Tokyo University of Fine Arts and Music, they came to be interested in the restoration of oil paintings when they entered the laboratory of the late Professor TERADA Shun'ichi in 1958, who had had interest in the techniques and materials of oil paintings and followed the instruction of YASUI Sotaro, then professor of the university, to do research in the field and to set up the laboratory. The present article is a record of a round-table talk in which the three former members of the laboratory look back on what they studied in his laboratory, how KOY ANO and MORITA Tsuneyuki, one of their colleagues studied abroad and expanded their knowledge, and how they began their own laboratories for the conservation and restoration of oil paintings.			