Restoration of Air-dried Specimen Using Parts of the Standard Plastination Equipment and Technique. ***De Jong KH.*** *Department of Anatomie en Embryologie, AMC Universiteit van Amsterdam, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands.*

Part of the Department of Anatomy in Amsterdam is the Vrolik Anatomical Museum where anatomical specimens are on exhibition which have been collected from the 18th century until today. Amongst them are approximately 50 air-dried specimen of muscles and tendons of arm and leg, placenta and several inner organs. Most of these specimens were collected in the early 20th century. Their method of drying is uncertain. On inspection a few years ago, most of these specimens proved to be infected with an unknown insect that acted as a termite: the specimen was destroyed from the inside out by eating it. A proven way to kill these insects was putting the specimens in a gas-chamber for a long period of time. However, as it was uncertain where the infestation came from, the specimens were not protected against a new infestation until an alternate way of sterilizing and protection was found. As an experiment, the dried specimen was placed in acetone in vacuum in order to de-aerate the specimen thoroughly and impregnate the specimen with acetone. After one week in acetone, the specimen was placed under a fume hood to let the acetone evaporate. This procedure was performed 3 times. The main goal was to kill the insects by dehydrating them, but as a side effect, it also proved to clean the specimen thoroughly. After the third acetone bath, the specimen was allowed to dry thoroughly under the fume hood. After drying, the specimen was first submerged and then brushed repeatedly with a mixture of fully pre-cured Biodure S10/S3 silicone dissolved in methylene chloride (3 ppv. S10/S3 in 100 ppv methylene chloride). The large amount of methylene chloride acts as a vehicle for the large slO molecules to penetrate deeply in the specimen thus covering the entire surface (inside and outside) of all structures in the specimen with a thin layer of silicone. After each brushing, the methylene chloride was allowed to evaporate under a fume hood. Finally, the specimen was normally cured using Biodur s6 gas hardener. No re-infestation was reported after this procedure. A nice side effect proved to be the possibility to clean dusty specimens under running tap water without ruining them.

Starting a plastination facility as a beginner: required equipment and approximate costs. ***De Jong KH.*** *Department of Anatomie en Embryologie, AMC Universiteit van Amsterdam, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands.*

Starting a plastination facility as a beginner requires an important decision before starting that is which technique is going to be performed. As the silicone technique is the most basic, and requires the simplest equipment, it is recommended to take this technique as the starting one. When more experienced, one is always able to expand to other techniques. This paper assumes one will use the Biodur® silicone S10 method. Plastination requires the following steps: 1) making the specimen, 2) preparing the specimen for plastination, 3) dehydrating the specimen, 4) impregnating the specimen with polymer and 5) curing the specimen. Each step may require specific equipment. Making a specimen for plastination doesn't differ from making a specimen for normal anatomy teaching and doesn't ask for special equipment. Preparing the specimen for plastination means (if necessary) the removal of glycerine and phenol from embalming fluid out of the specimen. This can be achieved by submerging the specimen in 50% ethanol and requires adequate containers. Dehydration, mostly performed in acetone at -20°C, requires a normal household deep freezer and at least 2 containers with a volume of approximately ten times the volume of the specimen. Stainless steel containers with a lid are preferred. A temperature calibrated acetonometer is used to monitor the progress of the dehydration. Impregnation under vacuum requires a vacuum kettle that can be placed in the deep freezer and has a see through lid in order to allow one to follow the progress of the process of impregnation. As a pressure of 5mm Hg has to be reached, a vacuum pump adequate for the plastination kettle is required. Several valves are used in order to adjust the pressure. Pressure is measured with a mercury Bennert manometer. The specimen has to be placed in an adequate container that fits in the vacuum kettle and has a volume big enough to contain the specimen and an amount of silicone rubber to keep the specimen submerged until the end of the impregnation process. The silicone impregnation bath has to be mixed according to the subscription of the manufacturer. Curing the specimen requires a container that can be closed airtight in which the impregnated specimen is placed and a hardener vaporized. Working with silicone rubber requires protective clothing, disposable gloves and paper towels to protect the worker and the working environment from smearing with silicone rubber. Initial costs of the equipment needed may differ with the amount of equipment already present in the laboratory. In Amsterdam, we were able to start with a budget of $2000.00.

Design of a Web-Based Cataloguing System for a Large Plastinated Pathology Museum Using High-Resolution Digital Imagery. ***Feener T, Gubbins B, Kell K, Kennedy L.*** *Department of Pathology, Queen's University and Kingston General Hospital, Kingston, Ontario, Canada.*

In the late eighties the Department of Pathology at Queen's University implemented one of the first plastination programs in Canada. The objective of the program was to create durable, and non-toxic, plastic impregnated specimens to replace the existing formalin mounted specimens used in teaching medical students and residents. The program used the standard S10 technique to plastinate fixed tissue specimens collected during routine autopsy procedures. Throughout the 1990's, the collection grew by approximately one hundred specimens a year and presently numbers over one thousand. While such a large and diverse collection is an invaluable teaching resource, the sheer size has become prohibitive to many faculty and professional staff who cannot afford the time required to search through the specimens. To overcome this, a novel project was undertaken to construct and implement a web-based cataloguing system using digitized images of the specimens that could be user-friendly, easily searched and fully automated for low maintenance requirements. To begin, all specimens in the collection were photographed with a high-resolution digital camera and file names were written to include index codes as well as keywords. The images were then transferred to a previously established Lab Information System (LIS) Image web server designed to function as a secure on-line catalogue and index for storing routine autopsy and surgical images. The LIS Image server provides professional staff with immediate access to autopsy, and now plastinated museum images, from their office computers. We will detail the design of the on-line catalogue system giving special consideration to image file nomenclature, hardware selection, use of freeware and open source software, web-design, data back-up, security, and searchability as well as camera hardware and image quality. Finally, we will highlight the many benefits that have resulted from the on-line system.

Naked Silicone Impregnation. ***Henry RW, Reed RB.*** *Department of Comparative Medicine, College of Veterinary Medicine, The University of Tennessee, Knoxville, Tennessee, USA.*

The standard S10 technique (Biodur™) has been used for impregnation and production of beautiful, high-quality specimens for 25 years. The Biodur™ process is most often used at cold temperatures. However, it may be used at room temperature. Its down side is that it commences to thicken in a few months. Four years ago, room temperature products were introduced that were stable at room temperature. This new room temperature process (Dow/Corcoran) yields good quality specimens and cuts production time by at least 50%. However, a distracting film occurs on the surface of the specimen. In order to speed up the process and still have the highest quality specimens, impregnation of silicone without catalyst/chain extender or cross-linker was carried out on a variety of specimens. Impregnation time ranged from one day to eight days. Because the viscosity of the polymer used was very fluid (40 centistokes), draining and manicuring time for the specimens was negligible. In fact, some specimens were wiped with silicone to rehydrate the surface which we believed was too dry in appearance. Two methods were used to cure the specimens: 1. Specimens were first exposed to the gaseous cross linker (S6) for 2 days then catalyst/chain extender (S3) were wiped onto the surface twice at 24 hour intervals. 2. Catalyst/chain extender were wiped onto the surface and allowed to sit for 24 hours, at which time, S3 was applied again. After another 24 hours the specimen was exposed to cross linker. Both methods resulted in polymerization of the outer layer of the specimen within three or four days with a sealed, dry surface. When specimens were sectioned two and four weeks later, the interior of the specimen contained uncured polymer. Time will tell if and how long it will take for the polymer to cure throughout the depths. The quality of the specimens appears to be similar to that of specimens produced via the classic Biodur™ method. The most noticeable plus for this method is that polymer runs freely off of hair-covered specimens which virtually eliminates the tedious manicuring task associated with the classic method. We believe that this is another useful method for producing specimens more rapidly and with out the need of refrigeration.

Polymer Chemistry in Silicone Plastination. ***Henry RW, Seamans G[1], Ashburn RJ[1].*** *Department of Comparative Medicine, College of Veterinary Medicine, The University of Tennessee, Knoxville, Tennessee, USA, 'Silicones Inc., 205 Woodbine Street, High Point, North Carolina, 27261, USA.*

Understanding basic polymer chemistry may help understand the plastination process. In any industry, various terms are used which may not be the standard but are entrenched in every day conversation. The silicone type used for plastination is silanol (in industry terms) and has repeating silicone molecules with terminal hydroxy groups. In general, polymers are

composed of very high molecular weight molecules. Silanol can be blended in any number of viscosities. Biodur™ S10 [500 - 700 centistokes (cstk)] is more viscous than some of the more recent entries (50 - 100 cstk) (North Carolina, Dow/Corcoran) into the plastination arena. The longer the silicone molecule, the more viscous the polymer. The more fluid the polymer, the easier to enter the specimen. In silicone plastination and in the silicone industry, a basic formula is a three-part system: polymer (S10), catalyst (S3) and cross linker (S6, hardener). The similar three components are used in the Dow/Corcoran method. The Chinese process appears to utilize a two-part system. The Biodur™ method is actually a four-part system. S3 is more than the catalyst. It also contains a chain extender. These components obviously are named in part for what the components do. The catalyst reacts with the cross linker and readies the silicone polymer for curing (cross linking). For silicone plastination, the recommended ratio of silicone polymer to catalyst (100:1) is quite forgiving. This may not be the case with epoxy polymer.

Vacuum Monitoring in Plastination. ***Henry RW.*** *Department of Comparative Medicine, College* ***of*** *Veterinary Medicine, The University of Tennessee, Knoxville, Tennessee, USA.*

Vacuum and decrease in pressure are often used synonymously. However, when the reading is recorded, zero for both are at opposite poles. When there is a decrease in absolute pressure (AP), vacuum is increased. Atmospheric pressure is around 76cm Hg (760mm) = 30 inches Hg at sea level. Values of decreasing pressure or increasing vacuum may be recorded as a fraction of an atmosphere, e.g., 1/3 atmosphere (20 inches or 50.8 cm of Hg, AP), 1/2 atmosphere (15 inches or 38.1cm Hg), or 2/3 atmosphere (10 inches or 25.4cm Hg, AP). Torr is a unit of measure also used with pressure. One torr equals 1/760 of an atmosphere. The reading obtained when measuring the change associated with pressure changes varies depending on the type of instrumentation. A column of Hg or vacuum gauge yields a progressively higher reading as absolute pressure is decreased. This is referred to as gauge pressure or units of vacuum. However, a manometer is read by the difference in height of two columns of mercury. Therefore, a progressively lower number and is read as AP. This is because the manometer is reading the difference in two columns of Hg. The vacuum gauge or column of Hg is using atmospheric pressure as point zero, while the manometer is using total vacuum as point zero. Because most manometers used in plastination laboratories utilize two columns of Hg whose difference in height is 22cm or less, approximately the last 1/3 or less of the change in the pressure/vacuum can be monitored. Hence, a vacuum gauge or Hg column is necessary to monitor changes in absolute pressure (vacuum) in the earlier stages (first two thirds) of impregnation. Therefore, understanding the variation of gauging methods and vapor pressures of solvents being used is necessary. The saturated vapor pressure (similar to boiling point) of methylene chloride is greater than that of acetone, 78.0mm Hg vs. 35.9mm Hg at -10°C or 32.5mm Hg vs. 14.8mm at -25°C, respectively. Hence, methylene chloride will vaporize at a higher AP and be extracted before acetone. An important item when using deep vats of silicone for impregnation is: pressure is proportional to depth. This results in pressure being greater at the bottom of the polymer than at the surface of the polymer. Therefore, acetone in the specimen will remain in a specimen that is submerged 15 to 20cm below the surface of the polymer longer than in a specimen near the surface. The gauge hooked to your apparatus is likely reading surface pressure.

Dehydration with Alcohol at Room Temperature and Use of Locally Available Polymers to Plastinate Human Tissue. *Jimenez R, Isaza O. Morphology Department, Medicine Faculty, Antioquia University, Medellin, Columbia.*

Biodur® polymers are used in plastination around the world using a variety of techniques described by different authors. These polymers are produced in Europe and are relatively expensive. The plastination technique using Biodur® polymers usually includes dehydration with acetone. Acetone is not readily available in Columbia due to legal restrictions. The difficulties involving cost of polymer and lack of acetone prompted us to work locally available polymers and solvents at room temperature to vary the technique of tissue impregnation. This will allow us to produce permanent human specimens for teaching anatomy in pregrade or postgraduate studies and for anatomical museum pieces. Our work modified the standard techniques described by von Hagens and other authors. Our procedure involved tissue fixation, dehydration in a graded series of isopropyl alcohol, immersion in xylene, impregnation with Cristalan 818® polymer and curing of the specimen. All of these products are readily available in Columbia. The results are good and permit us to continue in the search for the best results using this modified plastination technique (see front cover).

Anatomy of the Equine Tarsus: A study by MRI and Macroscopic Plastinated Sections (S10 and P40). *Latorre R, Vazquez JM,* ***Gil*** *F, Ramirez G, Lopez-*

Albors O, Ayala M, ***Arencibia*** *A. Anatomia y Embriologia, Facultad de Veterinaria, Universidad de Murcia, Campus de Espinardo, 30071 Murcia, Spain.*

The objective of this work was to define the normal gross anatomic appearance of the adult equine tarsus using plastinated sections and magnetic resonance imaging (MRI). Six equine pelvic limbs from adult horses were utilized. The arteries, veins and synovial structures were injected with red, blue and green latex respectively, using colored pigment paste (2% ppv): AC50 (red), AC52 (blue) and AC54 (green) (Biodur™, Heidelberg). Arterial injection was carried out via the femoral artery and injection was continued until red latex oozed from smaller arteries. After arterial injection, venous injection was performed via one of the two plantar digital veins, as distal as possible to avoid valve interference. The proximal ends of the veins were left open until blue latex started to ooze from them. The tarsocrural joint (Articulations tarsocruralis) was injected via its plantar pouches. The frozen limbs were sectioned transversely and sagitally from the tibia to the metatarsus with a high-speed band saw at the desired thickness (0.3 to 1 cm.). After slicing, fixation and dehydration, the slices were plastinated according to either the standard cold S10 technique (Biodur™) or a room temperature process, P40 technique (Biodur™). Using a scanner with a 1.5 Tesla magnet, image sequences were acquired in transverse and sagittal planes. Comparison between anatomical sections and MRI of this joint enabled us to establish the normal reference in MR images of different structures. Optimal image planes were identified for the evaluation of articular cartilage, subchondral bone, flexor and extensor tendons, tarsal ligaments and synovial structures. P40 plastinated sections and MR images provide a thorough evaluation of the anatomic relationships of the structures of the equine tarsus and essential information for diagnosis. The tarsocrural joint is an anatomically complex area and an understanding of this is a prerequisite for accurate diagnosis of injuries in this joint.

Epoxy Impregnation with no Hardener. *Latorre RM, Reed RB[1], Henry RW[1]. Anatomia y Embriologia, Facultad de Veterinaria, Universidad de Murcia, Campus de Espinardo, 30071 Murcia, Spain, department of Comparative Medicine, College of Veterinary Medicine, University of Tennessee, Knoxville, Tennessee, USA.*

A modification to the classic Biodur™ epoxy impregnation method was evaluated for attributes which might lead to increased casting time, increased ease of bubble removal and decreased yellowing of cured polymer. The impregnation bath was also evaluated as a reusable source of impregnation medium. Tissue slices were impregnated, in the absence of hardener, with epoxy polymer. Impregnated tissue was cast using modified reaction mixtures composed of varying amounts of epoxy polymer, hardener and glass separator. All cast tissue slices cured using the various reaction mixture combinations. Casting time was increased from 12 hours to 2 years. Bubble removal was easier due to the decreased viscosity of the experimental reaction mixtures. Blemishes did occur when tissues touched the glass of the casting chamber. These blemishes were easily repaired by recasting with a thicker gasket or by direct application of reaction mixture. Yellowing of the cured epoxy did occur but was not as severe as that which is seen with the classic epoxy impregnation method. Previously used impregnation mixture was reused two limes to successfully impregnate tissue slices.

Animating Dural Hematomas Using Plastinated Human Brain Sections. ***Lozanoff S[1], Lozanoff BK[2], Sora MC[3], Rosenheimer J[1], Keep M[1], Tregear J[4], Jacobs J[5], Saiki S[5,6], Alverson D[7].*** *'Department of Anatomy and Reproductive Biology, University of Hawaii School of Medicine, Honolulu, HI; [2]SURFdriver Software Company, Kailua, HI; [3]Department of Anatomy, Anatomical Institute, Vienna University, Vienna, Austria; [4]Department of Media Services, University of New Mexico, Albuquerque, NM; [5]Department of Medicine, University of Hawaii School of Medicine, Honolulu, HI; [6]Tripler Army Medical Hospital, Honolulu, HI, [7]Department of Pediatrics and Obstetrics and Gynecology, University of New Mexico School of Medicine, Albuquerque, New Mexico, USA.*

Computerized animation is becoming an increasingly popular method to provide realistic and dynamic presentation of anatomical concepts. However, most animations use artistic renderings as the base illustrations that are subsequently altered to depict movement. In most cases, the artistic rendering is a schematic that lacks realism. Plastinated sections may provide a useful alternative to artistic renderings to serve as a base image for animation. The purpose of this paper is to describe a method for developing animations using plastinated sections. This application is used in a problem-based learning environment involving traumatic head injury that results in an epidural hematoma with transtentorial uncal herniation. In addition, a subdural hematoma is animated permitting the student to contrast the two processes for a better understanding of dural hematomas in general. The method outlined utilizes P40 plastinated coronal brain

sections that are digitized and to which contiguous anatomical structures are rendered in Adobe Photoshop. Once the base illustration is rendered, it is loaded into Kai's SuperGoo and morphed. Finally, the animations are viewed with QuickTime to which audio narration is added and uploaded for viewing on the web. This method demonstrates how realistic anatomical animations can be generated quickly and inexpensively using plastinated brain sections. Supported by OAT, HHS, 2 DIB TM 00003-02.

Plastination of Pathologic Specimens via **Room** Temperature S10. *Miklosova M. Department of Anatomy, Medical Faculty, University of P. J. Safarik, Kosice, Slovak Republic.*

The standard silicone technique (S10) is the classic plastination method. Plastination preserves the normal anatomy, whether human or veterinary, and the relationships among structures. Plastinated pathologic specimens give a different view of anatomy. The normal form of these specimens is altered by the pathologic process and may require a different approach. In addition, the post mortem examination often distorts or even destroys the anatomical relationship. Such specimens require individual thought following the necropsy to enable a useful specimen to be prepared and preserved. Detailed knowledge of typical macroscopic changes of the organ is the basic premise for correct interpretation of the pathologic process. Plastination is a unique method for preserving these altered biological tissues. Specimens (fibroma molle, fibroma durum, uterine myomas) were prepared for the Department of Veterinary Pathology using room temperature impregnation. To enhance specimen quality and preserve color differences, a special fixative composed of: formalin, pyridine, nicotine acid, Dithionit (natrium hydrosulfurosum) and distilled water was formulated. This fixative preserves color and furry coats and enhances flexibility. Specimens were fixed for 4 weeks and then flushed with water. All specimens were dehydrated in cold (-25°C) acetone using three weekly changes. The dehydrated specimens were impregnated in a room-temperature polymer reaction-mixture of S10 and S3 (100:1) for impregnation. After impregnation of eight weeks was completed, the specimens were drained and the polymer was stored in the deep freezer and used for another group of specimens at a later time. The specimens were drained of excess polymer and hardened by exposure to S6 for two days. These specimens highlight the mentioned pathology and are being used as a teaching supplement in our veterinary anatomic pathology teaching laboratories.

Plastination of Stained Biological Specimens: Their Use in a Teaching Environment. *Mizer L, Schneck P. College of Veterinary Medicine, Cornell University, Mica, New York, USA.*

Teaching resources for the study of bone and cartilage in gross anatomy, microscopic anatomy, comparative anatomy and embryology are frequently restricted to formaldehyde or glycerin immersed specimens. In many of these disciplines, we use fetal and early neonatal specimens that have been cleared and subsequently stained with alizarin red and/or alcian blue to demonstrate the relative amounts of cartilage and bone in the developing skeleton. Although such specimens are useful as originally prepared and stored in glycerin, they can be messy to handle and examine under a dissecting microscope. Our laboratory has undertaken the plastination of alizarin red and/or alcian blue stained late gestation fetuses and early neonates to provide a relatively durable specimen that is easy and clean to manipulate and study. Using pre-existing alizarin or alizarin/alcian blue stained glycerin-immersed specimens or formaldehyde or alcohol fixed specimens that we subsequently stained, we have plastinated fetuses and whole body or sectioned neonates from various species. Although not ideal in their positioning they do provide examples of the quality of specimen that may be attained for use in multiple settings in the veterinary curriculum at the College of Veterinary Medicine at Cornell University.

Epoxy Under Vacuum. *Reed RB, Henry RW. Department of Comparative Medicine, College of Veterinary Medicine, The University of Tennessee, Knoxville, Tennessee, USA.*

Epoxy reaction mixture is commonly placed under vacuum to remove air bubbles from the casting chamber. This often appears to create more air bubbles within the chamber than were originally present. In order to determine the source of these newly created gas bubbles, we subjected components of the epoxy reaction mixture (El, El2, AE30), singly and in various combinations, to full vacuum. Bubbles first generated at moderate low pressure were most likely air introduced into the mixtures at an earlier point in time. At low pressure, bubbles were generated in all beakers in which polymer (El2) and hardener (El) were present. Bubble production was greatest in mixtures containing El2. Bubble production also occurred to a lesser extent in mixtures containing El in which no E12 was present. Glass separator alone generated no gas bubbles. These findings suggest that exposing epoxy reaction mixture to low pressure causes the release of a component of both El and El2 in a gaseous form which adds more

bubbles to the casting chamber. Loss of these components does not affect the curing of the epoxy reaction mixture.

Plastination Dehydration Mediums: Time and Temperature. ***Reed RB, Henry RW.*** *Department of Comparative Medicine, College of Veterinary Medicine, The University of Tennessee, Knoxville, Tennessee, USA.*

To determine the minimal length of time required for tissue dehydration using acetone, various animal organs were exposed to room temperature and cold acetone which was changed every 24 or 48 hours according to the experimental protocol. Dehydration of specimens in cold acetone which was changed every 24 hours ranged from 5 to 7 days while those in room temperature acetone ranged from 5 to 6 days. Dehydration of small animal organs with room temperature and cold acetone that was changed every 48 hours ranged from 8 to 10 days while tissues from large animals required 10 to 12 days. Our findings also demonstrate that dehydration is most rapid early in the process making more frequent acetone changes desirable for the most expedient dehydration of tissues.

Shrinkage Assessment with Classic Plastination Dehydrants. ***Reed RB, Henry RW.*** *Department of Comparative Medicine, College of Veterinary Medicine, The University of Tennessee, Knoxville, Tennessee, USA.*

To assess the shrinkage effects of current plastination dehydrating agents upon tissues, a variety of animal organs were dehydrated with room temperature acetone, cold acetone and room temperature methanol. The average shrinkage to tissues dehydrated with cold acetone was 14.5% of the original size of the tissue. The average shrinkage caused by room temperature acetone was 20.2% of the original tissue size. The largest average tissue shrinkage, 22.6%, was attributed to room temperature methanol. To minimize tissue shrinkage during dehydration, cold acetone should be the preferred method of the three examined in this study. The shrinkage to tissue caused by room temperature acetone and methanol is most likely great enough to alter results in quantitative studies using such organs. However, their general appearance is not distorted which renders them useful for general anatomical studies in the classroom. Room temperature dehydration is effective for plastination purposes; however, the increased shrinkage factor must be weighed against the benefits of room temperature plastination.

Use of Plastinated **Specimens in Medical Teaching Modules.** ***Riederer BM.*** *Instiut de Biologie Cellulaire et de Morphologie, University of Lausanne, Rue du Bugnon 9, 1005 Lausanne, Switzerland.*

The necessity to reduce the number of courses and dissection hours in teaching human gross anatomy in the second year of medical studies required a profound reorganization. In consequence, among the modules to restructure were the dissection of upper and lower extremities. One module usually consisted of 27 hours of dissection distributed over 9 afternoons, but had to be reduced to three blocks of two hours of self-directed learning on prosected specimens. Assistants prosected specimens and so got familiarized with the teaching material. They were also in charge to supervise and guide the students and furthermore gave them a good opportunity to learn topographical anatomy in more detail. During the two first hours of the self-directed teaching module, cutaneous innervation and articulations were studied. This was followed by the topography of the thigh and popliteal region, and finally lower leg and foot were studied. The prepared wet specimens were usually kept in 50% alcohol solution between courses and preserved well for the exception of more fragile structures. Delicate nerve structures of different cutaneous regions resisted only for a short time the inquisitive approach of our students. Even nerves sutured to the tissue were soon torn apart. In order to reduce the number of dissection specimens, we now started to prepare specimens for plastination, this mainly to have more resistant pieces. Specimens were plastinated by the standard S10 method. An approach by dissection permits one to slowly progress in defining the topographical anatomy and prepare for the important structures to locate, while dissected tissues are ready for teaching without tedious search and allowing an immediate approach and therefore considerably reduce the number of teaching hours. Although more care was given to have ideal specimens, some critique rose from students that felt the pressure to learn more in a shorter time and the lack of experiencing exploratory learning. Advantages of introducing dissected and plastinated tissues are manifold. Fewer bodies are used because of a reduced necessity to prepare new specimens every year. Furthermore, delicate structures become more resistant and well dissected tissues preserves for a long time. In addition, plastinated samples can be used also outside the dissection hall. The introduction of plastinated samples added another tool to teaching gross anatomy. However, it does not change the capacity of students to learn more in lesser time.

Inferior Alveolar Nerve Anatomy Revisited: A Study Based on Dissection and Plastination. *Weiglein* ***AH[1]*****,** *Kqiku* ***L[2]*****, Pertl C[2].** *'institute of Anatomy, [2]Department of Dental Surgery and Radiology, Karl-Franzens-University, Graz, Austria.*

Dental implants sometimes cause pain due **to** pressure on the inferior alveolar nerve. If there are multiple implants, it is impossible to select and subsequently remove or change the implant that causes the pain. In order to enable the accurate selection of the cause of pain, we dissected 10 mandibular canals of cadavers embalmed with the Graz embalming technique and proved the findings by both histological and plastinated serial slices. Whole mandibles were plastinated with polyester resin and finally enclosed in a block of polyester. After complete curing, the polyester block was sectioned by a diamond band saw (Exakt 310 CP) with laser-oriented section control into 100µm slices. The mandibular canal contains a bundle of nerves that comprise two larger nerves that are separately wrapped in perineural sheaths, one of which is the dental nerve supplying branches to the dental alveoli. The other is the mental nerve that emerges from the canal through the mental foramena to supply the skin and mucosa of lower lip, cheeks and chin. The mental nerve lies anterior to the dental nerve in the posterior molar region and passes it inferiorly in the anterior molar region to finally emerge from the canal laterally in the premolar region. Based on these anatomical findings, the implant causing the pain can be selected accurately and the source of pain can be removed to relieve the patient.

The International Society for Plastination: Mission and History. *Weiglein AH. Institute of Anatomy, Karl-Franzens-University, Graz, Austria.*

Twenty-four years ago, the first publication on plastination entitled "Impregnation of large specimens with polymers" was issued in the German journal Verhandlungen der Anatomischen Gesellschaft. A year later, in 1979, it was published in Anatomical Record and later on in 1979 the term "plastination" appeared in The Preparator. The first conference on Plastination was held in San Antonio, Texas in 1982. Since then, plastinators from all over the world meet every even year for an international conference. Interim meetings, which are primarily workshop based and usually take place in the USA, were started in 1989 in Knoxville, Tennessee. In 1987, the first issue of "The Journal of the International Society for Plastination" was published. In 1996, the first issue of the Current Plastination Index, an index listing all publications dealing with plastination, was issued. However, it was not before 1996 that the International Society for Plastination (ISP) was officially founded during the meeting in Graz. Since then, the ISP serves as a forum for the exchange of information about plastination that is accomplished by the publication of the journal, by holding conferences, meetings and workshops on a regular basis and by our web page and list server.

Plastination: A Tool for Teaching and Research. ***Weiglein*** *AH. Institute of Anatomy, Karl-Franzens-University, Graz, Austria.*

Plastination is a unique technique of tissue preservation developed by Dr. Gunther von Hagens in Heidelberg, Germany in 1978. In this process, water and lipids in biological tissues are replaced by curable polymers (silicone, epoxy, polyester) which are subsequently hardened, resulting in dry, odorless and durable specimens. Silicone is used for whole specimens as well as for body and organ slices to obtain a natural look. Epoxy resins are used for thin, transparent body and organ slices. Polyester is mainly used for brain slices to achieve excellent distinction of gray and white matter. The standard technique consists of four main steps: 1) Fixation, 2) Dehydration, 3) Forced Impregnation, 4) Hardening (Curing). Fixation can be done by almost all conventional fixatives. Dehydration is achieved mainly by acetone because acetone also serves as the intermediary solvent during impregnation. Because this step is originally done at -25°C, it is also known as freeze substitution. Forced impregnation is the central step in plastination: vacuum exchanges acetone by the polymer. Finally, the impregnated specimen is hardened by exposing it to a, usually gaseous, hardener (silicone) or by UVA-light and heat (polyester, epoxy). Although they cannot replace dissection, because they are not flexible, plastinated specimens are perfect museum models and thus, teaching aids. Sheet plastination is also used in research, particularly in comparison with CT- and MRI-images. New devices for sectioning (diamond wire and diamond band saws) provide a new tool for the production of thin slices (approximately 100µm - and in combination with a diamond grinding device down to 10*µm)* of large specimens (up to the size of a human head).