The P 35 technique for sheet plastination of the human head. R.T. de Boer-van Huizen, C.J. Cornelissen, and H.J. ten Donkelaar, Department of Anatomy and Embryology, Faculty of Medical Sciences, University of Nijmegen, The NETHERLANDS.

Modern imaging techniques such as computed tomography (CT) and magnetic resonance imaging (MRI) require a basic knowledge of cross-sectional anatomy of the human head or central nervous system (CNS). Although excellent volumes on sectional anatomy of the human head and CNS are available as anatomical guides for the analysis of CT and MRI sections, the study of real sections of the human head would be preferable, particularly for teaching purposes. Macrosections of the human head or brain have some disadvantages in that they have to be kept in formalin, fall apart because of handling and the differentiation between white and grey matter of the brain becomes less distinct in time due to the bleaching effect of the fixative. Plastination, a technique of tissue preservation, introduced by Dr. Gunther von Hagens of Heidelberg, Germany, offers the possibility to prepare clean, dry and easy to handle slices. In the process of plastination, water and lipids are replaced by polymers which are subsequently hardened resulting in drying, odorless and durable specimens. The P35 plastination technique used gives excellent differentiation between grey and white matter of the brain and offers excellent reference material for pre- and postdoctoral training in cross-sectional anatomy. In the present study the P35 technique, was applied to 4 mm anatomical slices of a formalin-fixed human head.

A new positioning technique for comparing sectional anatomy of the shoulder with sectional diagnostic modalities: magnetic resonance (MR) imaging, computed tomography (CT) and ultrasound (US). C.A.C. Entius, J.W. Kuiper,* W. Koops,* A. de Gast, Department of Anatomy and *Radiology, and ERASMUS University Rotterdam, The NETHERLANDS.

A new positioning technique is presented, based on MR- and CT imaging with surface markers applied to the skin of the specimen. With this technique, the required anatomic section for cryosectioning can be defined accurately. Plastinated slices, of 2 mm thickness, with the correlating MR-, CT-, and US images of double-oblique coronal imaging of the shoulder are shown. The method is equally applicable to all parts of the body and makes comparison of structures in correlative anatomic studies easier and more accurate.

E 20 colour injection and plastination of the brain. Alfred Riepertinger and Evelyn Heuekendorf, * Institute of Pathology, City-Hospital Munchen-Schwabing, Kolner Platz 1, 8000 Munchen 40, and institute of Anatomy, Medical Faculty, The Humboldt-University of Berlin, Philippstrasse 12, 0-1040 Berlin, GERMANY.

After six years of experience with the S 10 standard-plastination technique of brain specimens, we are now interested in the representation of the arterial supply of the human brain. To facilitate students identification vessels, red BIODUR E 20 was selected for vascular injection. In situ injection was suitable for the colour injection of the arteries of the brain for plastination. First, the four arteries supplying the brain [two common carotid arteries (internal and external) and two vertebral arteries] were exposed and a 4-way-injection-system was ligated in the vessels. This injection-system was used to: rinse the vascular system with 2 L of physiological saline solution, prefix with 2 L of 10% formalin solution, and inject 40 ml of BIODUR E 20 red. After polymerization of the epoxy has proceeded for 12 hours (overnight), the brain was carefully removed from the cranial cavity and immersion fixed in 5% formalin with 400 g of refined crystal sugar added. The fixed brains were dehydrated for 2 weeks at -25°C, followed

by 2 weeks at room temperature to release fatty substances from the specimen. Forced impregnation, using standard S10/S3 polymer mix, proceeded for 3 weeks at -25°C in the deep-freezer. After removal from the vacuum-kettle and a period of draining for 5 hours at room temperature, the specimen was placed in a plastic tub for hardening using BIODUR S 6 for about 3 weeks. When the specimen became hardened on the surface, it was sealed in polyethylene foil for 4 weeks to complete hardening. At the end, a plastinated specimen of the human brain and its arteries was available for instruction and research in medicine.

Equipment for Plastination - an Overview. Stephan M. Probst; University of Heidelberg, Heidelberg, GERMANY.

The most important accessory for plastination is protective clothing for handling the toxic and aggressive chemicals like formaldehyde, acetone, methylene chloride or epoxy resins. Often pretreatments such as dye injection, cutting and slicing are necessary before fixation and impregnation of the specimen. Parenchymatous organs can be sliced into the desired thickness with a commercial type meat slicer. In order to prepare head-thorax sections or extremity sections, a band saw with a guide stop is necessary. When purchasing a saw, one must remember that the size of the guide stop, the maximum depth of cut, and the size of the belt saw wheel, determine the specimen size which must be cut. Conventionally, the specimen is fixed in a formaldehyde bath. Lungs or hollow organs should be fixed with formaldehyde under hydrostatic pressure, to keep the organ dilated. A pump may be used to pump the formaldehyde back into the reservoir. A deep freezer and acetone proof containers (preferably, stainless steel) are necessary for freeze substitution dehydration. Stacked tissue slices must be separated by plastic grates and fly screen. An explosion safe pump system to exchange the acetone is useful especially when using large volumes of acetone. The vacuum chamber must accommodate the specimen and the appropriate vacuum must be applied. For 10 liters of impregnation solution, a pump capacity of 1m³/h is recommended. When starting impregnation, let the pump warm to operating temperature before evacuation. To prevent condensation of the solvent in the pump, keep the gas ballast valve open. After impregnation, allow the pumps to run for an additional 30 minutes against vacuo to remove solvent which is in the oil. A desiccator jar and the Heidelberg kettle are useful inexpensive vacuum chambers. The danger of implosion is a disadvantage of desiccator jars. Therefore, do not move the jar when under vacuum, and cover with plastic wrap to prevent the scattering of glass splinters. The impregnation of skin or capsule enclosed specimens is accompanied by the problem of shrinkage. This can be prevented through repeated infiltration of the specimen with resin. A reciprocating pump driven by compressed air can be employed to inject resin. Silicone specimens are cured in a sealed container. Gas cure (S 6) may be volatilized rapidly using an aquarium pump. Calciumoxide granules are used to absorb the moisture. For Sheet Plastination additional instruments are needed: incubator, saw and grinder. Brain slices (BIODUR P 35) need UV irradiation and appropriate cooling. The plastinated tissue sections are covered with adhesive foil to prevent scratching. The tissue section is cut to size and the edges polished with a wet grinder. Dental drills are useful to polish the edges of head sections. A vacuum cleaner is helpful to suck off the dust during sawing (and grinding). The standard equipment for Plastination varies with the type and quantity of specimens to be produced. A talent for improvising is useful because problems will arise, and a tool will be needed which hasn't been seen in a Plastination lab yet. Plastinators must keep their eyes open in the supermarket, the kitchen or workshop to discover new items which could be of use in the Laboratory.