TABLE I.
Comparison of Oxygenators.

	Vertical cylinder	Half vertical cylinder	30x40 funnel	20x53 funnel	Half 20x53 funnel
cc O_2 introduced into blood per min.					
Avg	11.5	9.3	3.3	4.6	3.8
Max.	20.7	16.5	6.4	7.3	4.9
Avg vol. content, cc	48	29	42	41	26
cc O_2/min per cc blood					
Avg	.201	.247	.082	.093	.145
Max.	.390	.470	.165	.189	.195
Avg blood flow, cc/min.	250	250	200	250	250

volved in a similar manner to the cylinder, and O_2 analyses made on the blood before and after oxygenation.

Results. The efficiency of the funnel as an oxygenator was considerably less than that of the cylinder, an average of 0.10 cc and a maximum of 0.189 cc O_2 per minute per cc film content being introduced into the blood. The steeper funnel was the better oxygenator. Using 50% of the funnel area increased the efficiency as an oxygenator 56%. Varying the speed of rotation from 87-200 r.p.m. made no difference in the amount of oxygen introduced into the blood.

Summary. 1. More oxygen can be introduced into blood per unit volume of film in a vertical revolving cylinder of 18 cm diam. if segments 18 cm long are used than if the segments are 38 cm long. An increase in efficiency of 23% was obtained. 2. Speed of rotation does not, within the ranges of 100 to 250 r.p.m., affect film content or oxygenation in such a vertical revolving cylinder. 3. The vertical revolving cone does not make a good oxygenator but may conceivably be used to collect blood atraumatically from vertical cylinders.

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Polyethylene Plastic Needle Guides for Angiostomy.*

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A method whereby access can be gained to deep-lying vessels and chambers in the unanesthetized animal has many uses in experimental biology. London and Chlaponina[1] described a cannula for this purpose, which could be sutured to any desired large vessel and whose external end could be placed in the subcutaneous tissue. This device was used for obtaining blood samples in the course of metabolic studies. Hamilton and his coworkers[2] measured pressures in the lesser circulation through needle guides. These were constructed of metal, in two parts, and were usually seated intrapericardially in 2 operations.

The almost inert plastic, polyethylene,[3] lends itself well to the construction of needle guides that possess many advantages. These guides are prepared by blowing a suitable section of polyethylene tubing (4-6 mm o.d.) into a flattened spheroid with the aid of a

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2 Hamilton, W. F., Woodbury, R. A., and Vogt, E., *Am. J. Physiol.*, 1939, **125**, 130.

3 Ingraham, F. D., Alexander, E., and Matson, D. D., *N.E.J. Med.*, 1947, **236**, 362.

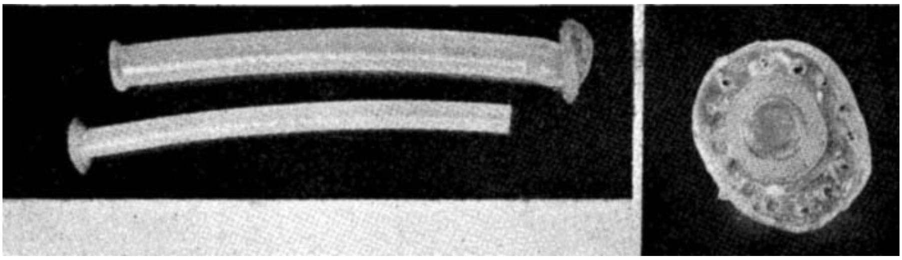

FIG. 1.
Plastic needle guide. At the left, above, is shown the guide which is sewn to the vessel or chamber. Its obturator, a segment of tubing with a cup-shaped outer end, is shown below it. At the right is an enlarged view of the foot plate showing the eyelets.

small flame. Most of the spheroid is then trimmed off leaving a curved flange which projects about 2 mm beyond the tube. A portion of the membranous segment that has been trimmed off is now faced about and sealed with a hot instrument into the flange so that its curve fits cupwise into the end of the cannula (Fig. 1). Thus the end of the tube is once again closed. This procedure is advantageous in that (1) When the needle is introduced through the guide, contact with the firm membrane at the bottom indicates that the wall of the vessel is immediately beneath. (2) After penetration, the polyethylene supports the tip of the needle and aids in keeping it from slipping too far across the lumen with possible injury of the opposite wall. (3) The membrane acts as a tampon in controlling any hemorrhage from the wall when the needle is withdrawn.

Perforations are made circumferentially through the flange in the manner illustrated in Fig. 1. These eyelets serve for suturing the guides intrapericardially to the external coats of the pulmonary artery and left auricle respectively. The attachment to the auricle is made at the posterior pericardial reflection. Sterilization of the polyethylene can be accomplished with little distortion by boiling or by soaking in an appropriate solution. Care is exercised in bringing the free ends of the cannulas to the subcutaneous position without distorting the pulmonary artery or left auricle. The cannula from the former can be brought out anteriorly along the mediastinal pleura; that from the left auricle is oriented in the interlobar fissure so as not to compress the structures of the hilum. The guides are cut to appropriate length with a scalpel. Their free ends are fixed by suture in the subcutaneous tissue of the lateral aspect of the thorax. An obturator of smaller polyethylene tubing with a cup-shaped external end may be introduced into each cannula. The chest is then closed in layers, taking care to re-expand the lungs.

The inert polyethylene in the entire operative procedure produces minimal adhesions. Healing usually is rapid and uneventful.

Blood may be obtained or pressures measured with the Hamilton manometer or other suitable means, by introducing 18-gauge "spinal" needles through the sterilized skin into the guides. If difficulty is encountered, the head of the guide can be exposed in a very short incision after anesthetizing the skin which is first displaced in a fold so made that the line of incision will later not overlie the cannula.

Summary. The construction of a polyethylene plastic angiostomy cannula is described. This cannula has many advantages for manometry of otherwise inaccessible structures in the intact animal.